THE PHILIPPINE
JOURNAL OF SCIENCE

VOL. 33 JULY, 1927 No. 3

INQUIRY INTO THE SEROLOGIC SIDE-EFFECTS OF THE ANTIRABIC PREVENTIVE TREATMENT

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This study was undertaken with the view to establish the presence or absence of such heterogenic antibodies as may occur in the blood of patients receiving antirabic preventive treatment or, in other words, receiving repeated injections of rabbit nerve tissue. It occurred to me that repeated injections of rabbit nerve tissue of the spinal cord in the form of an emulsion might act as a heterogenic antigen and produce a phenomenon in the blood of the patient similar to that known as Forsemann's phenomenon. The antirabic preventive treatment as practiced in the Philippines consists of twenty-five injections with emulsions of three-day-dried cord of a rabbit that has been inoculated with fixed virus by the subdural method and become completely paralyzed seven to nine days after inoculation.

The plan of the study was to follow the natural antibodies of human blood before and during treatment and further to study the specific antirabbit protein antibodies that might lead to hypersensibility of the patient to the foreign protein. It is true that the cord as prepared for drying is practically devoid of all blood; yet there must be traces of serum and protein that are being admixed with the antirabic vaccine.

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Although the findings were negative throughout, yet the information gained from this investigation is both important and satisfying in that no unnecessary harm is done to the patient receiving this treatment.

As a preliminary experiment the Forsemann's phenomenon was repeated.

A guinea pig was killed and the kidney and the cerebellum of the animal were removed.

The kidney was ground in a sterilized mortar and 10 cubic centimeters of physiological salt solution were added to make a suspension.

The suspension was heated on a water bath at 56° C. for thirty minutes. The heated suspension was centrifuged and the supernatant fluid filtered through sterile filter paper.

The resulting fluid was injected intravenously into a rabbit in amounts of 0.5 cubic centimeter, 1 cubic centimeter, and 2 cubic centimeters, every six days. The rabbit was bled ten days after the last injection. The guinea pig's cerebellum was treated in the same manner. The results are given in Table 1. They show that guinea pig central nerve tissue acts as a heterogenic antigen when injected into a rabbit.

HÆMOLYSIS OF GUINEA PIG RED CORPUSCLES BY HUMAN SERUM DURING PREVENTIVE ANTIRABIC TREATMENT

TECHNIC

Antigen.—The blood was withdrawn from the guinea pig's heart by means of a sterilized syringe previously washed out with sterile physiological salt solution; the blood thus withdrawn was placed in a test tube which contained about 5 cubic centimeters of a 1.5-per-cent solution of sodium citrate to prevent coagulation. The red corpuscles were washed four times by adding saline solution to the sediment of the blood corpuscles in the centrifuge tube. A 2-per-cent suspension of red blood corpuscles was used.

Patient's serum.—Blood withdrawn from the cubital vein of a patient by means of a syringe was placed in a sterilized test tube and allowed to stand until the serum separated from the clot. The serum was then centrifuged clear of red corpuscles.

ARRANGEMENT OF EXPERIMENT

Four small test tubes for each patient and one test tube for control were arranged in a rack.

Into the four small test tubes the patient's serum was placed in the following amounts: 0.7, 0.5, 0.3, and 0.1 cubic centimeter. Physiological salt solution was added to each tube to make the total amount of the fluid in each test tube 1 cubic centimeter. The control tube received 1 cubic centimeter of saline solution. The tubes were thoroughly stirred so as to mix well the serum and the saline solution.

One cubic centimeter of a 2-per-cent suspension of guinea pig red blood corpuscles was added to each tube of the above-mentioned series and all of the tubes were stirred thoroughly.

Incubation at 37° C. followed. Reading of hæmolysis was made every fifteen minutes.

At the end of two hours' incubation the tubes were taken out of the incubator and the last reading was protocoled.

TITRATION OF HÆMOLYSINS IN THE SERA OF PATIENTS

The titration of hæmolysins in the patient's serum was made in such a way that the minimal amount of the serum that produced complete hæmolysis after not more than two hours' incubation was ascertained.

HÆMOLYSIS OF SHEEP AND RABBIT RED CORPUSCLES BY THE BLOOD SERUM OF PATIENTS DURING THE ANTIRABIC TREATMENT

The technic and the arrangement of the experiments with rabbit and sheep red corpuscles were the same as described above. The details are evident from the attached tables. For results of this test see Tables 1 to 7. They show that rabbit central nerve tissue does not act as a heterogenic antigen when repeatedly injected into human beings in the form of antirabic vaccines.

TABLE 1.—*Showing the results of a hæmolytic test using heterogenic hæmolytic serum and sheep red cells.*[a]

[+ = complete hæmolysis; ± = no hæmolysis.]

Dilution.	1:1	1:4	1:16	1:512	1:640	1:1280	1:2560	1:5120
Rabbit:								
Normal	—	—	—	—	—	—	—	—
Kidney	+	+	+	+	+	+	+	—
Cerebellum	+	+	+	+	+	+	—	—

[a] Five-tenths cubic centimeter of 1:10 dilution of guinea pig complement inactivated hæmolytic serum; 1 cubic centimeter of 2 per cent suspension of sheep red cells, recorded as hæmolysis.

[++++ = complete hæmolysis; +++ = almost complete hæmolysis; ++ = weak hæmolysis; + = traces of hæmolysis; — = no hæmolysis.]

Patient's No.	Name.	Sex.	Age.	Duration of treatment.	Amount of serum.	Results.				
						15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.
			Years.	*Days.*	*cc.*					
1	O. S	Male	48	0	0.3	++++	++++	++++	++++	++++
					0.1	—	+	+	++	++
2	P. D.	Female	40	0	0.3	++++	++++	++++	++++	++++
						—	—	—	—	+
3	C. A	Male	62	0	0.3	++++	++++	++++		
					0.1	++++	++++	++++		
4	I. C	do	37	0	0.3	++++	++++	++++		++++
					0.1	+	+	+		++
5	J. T	do	21	2	0.3	+++	++++	++++	++++	++++
					0.1	—	—	—	—	—
6	N. M	do	42	4	0.3	++++	++++	++++	++++	++++
					0.1	—	+	+	++	++
7	T. S	do	24	5	0.3	++++	++++	++++	++++	++++
					0.1	—	+	+	++	++
8	J. L	do	20	8	0.3	++++	++++	++++		++++
					0.1	—	—	+		++
9	S. M	do	29	9	0.3	++++	++++	++++		++++
					0.1	+	+	+		++
10	R. R	do	18	10	0.3	++++	++++	++++	++++	++++
					0.1	—	+	+	+	+
11	P. G	do	32	13	0.3	++	+++	++++	++++	++++
					0.1	—	—	—	—	—

TABLE 3.—*Showing the results of titration of normal antiguinea pig hæmolysin in the blood of patients at the end of antirabic treatment.*

[++++ = complete hæmolysis; +++ = almost complete hæmolysis; ++ = weak hæmolysis; + = traces of hæmolysis; — = no hæmolysis.]

Duration of treatment.	Name of patient.	Amount of serum.	Results.				
			15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.
Days.		*cc.*					
20	M. R.	0.7	++++	++++	++++	.....	.....
		0.5	++++	++++	++++	.....	.....
		0.3	++++	++++	++++	.....	.....
		0.1	++++	++++	++++	.....	.....
		0.05	—	—	+	.....	.....
		0.01	—	—	—	.....	.....
20	P. G.	0.3	++	++++	++++	.....	++++
		0.1	—	—	—	.....	+
		0.05	—	—	—	.....	—
		0.01	—	—	—	.....	—
21	T. S.	0.3	+	+++	+++	+++	+++
		0.1	—	—	—	—	—
		0.05	—	—	—	—	—
		0.01	—	—	—	—	—
20	N. M.	0.3	++	+++	++++	++++	++++
		0.1	—	—	—	—	—
		0.05	—	—	—	—	—
		0.01	—	—	—	—	—
20	J. T.	0.3	++++	++++	++++	++++	++++
		0.1	++	+++	+++	+++	+++
		0.05	—	+	+	+	+
		0.01	—	—	—	—	—
20	J. L.	0.3	++++	++++	++++	++++	++++
		0.1	+	+	+++	+++	+++
		0.05	—	—	—	—	—
		0.01	—	—	—	—	—
20	P. D.	0.3	++++	++++	++++	++++	++++
		0.1	++	++	++	++	++
		0.05	—	+	+	+	+
		0.01	—	—	—	—	—
20	C. A.	0.3	++++	++++	++++	++++	++++
		0.1	++++	++++	++++	++++	++++
		0.05	—	—	—	—	—
		0.01	—	—	—	—	—
25	C. G.	0.3	++++	++++	++++	++++	++++
		0.1	—	+	+	+	+
		0.05	—	—	—	—	—
		0.01	—	—	—	—	—
20	J. C.	0.3	++++	++++	++++	++++	++++
		0.1	++++	++++	++++	++++	++++
		0.05	—	—	—	—	—
		0.01	—	—	—	—	—
20	E. M.	0.3	++++	++++	++++	.....	++++
		0.1	—	—	—	.....	+
		0.05	—	—	—	.....	—
		0.01	—	—	—	.....	—

TABLE 4.—*Showing the results of titration of normal antiguinea pig hæmolysin in the blood serum of the same patients at the beginning and at the end of antirabic treatment.*

[++++ = complete hæmolysis; +++ = almost complete hæmolysis; ++ = weak hæmolysis; + = traces of hæmolysis; — = no hæmolysis.]

Patient's No.	Name.	Sex.	Age.	Duration of treatment.	Amount of serum.	Results.				
						15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.
			Years.	*Days.*	*cc.*					
25	P. G.	Male	32	13	0.5	++++	++++	++++	++++	++++
					0.3	++	+++	++++	++++	++++
					0.1	—	—	—	—	—
				20	0.5	0	0	0	0	0
					0.3	++	++++	++++	++++	++++
					0.1	—	—	—	—	—
26	T. S.	do.	24	5	0.5	++++	++++	++++	++++	++++
					0.3	++++	++++	++++	++++	++++
					0.1	—	+	+	++	++
					0.5	0	0	0	0	0
					0.3	+	+++	+++	+++	+++
					0.1	—	—	—	—	—
27	N. M.	do.	42	4	0.5	++++	++++	++++	++++	++++
					0.3	++++	++++	++++	++++	++++
					0.1	—	+	+	++	++
				20	0.5	0	0	0	0	0
					0.3	++	+++	++++	++++	++++
					0.1	—	—	—	—	—
28	J. T.	do.	21	2	0.5	++++	++++	++++	++++	++++
					0.3	+++	++++	++++	++++	++++
					0.1	—	—	—	—	—
				20	0.5	0	0	0	0	0
					0.3	—	+	+	+	+
					0.1	—	—	—	—	—
29	J. L.	do.	37	8	0.5	0	0	0	0	0
					0.3	++++	++++	++++	0	++++
					0.1	—	—	+	0	++
				20	0.5	0	0	0	0	0
					0.3	++++	++++	++++	++++	++++
					0.1	+	+	+++	+++	+++
30	P. D.	Female	40	0	0.5	++++	++++	++++	++++	++++
					0.3	++++	++++	++++	++++	++++
					0.1	—	—	—	—	+
				20	0.5	0	0	0	0	0
					0.3	++++	++++	++++	++++	++++
					0.1	++	++	++	++	++
31	C. A.	Male	62	0	0.5	++++	++++	++++	++++	++++
					0.3	++++	++++	++++	++++	++++
					0.1	++++	++++	++++	++++	++++
				20	0.5	0	0	0	0	0
					0.3	++++	++++	++++	++++	++++
					0.1	++++	++++	++++	++++	++++

TABLE 5.—*Showing the results of normal antirabbit hæmolysin in the blood serum of the patients at the beginning of the antirabic treatment.*

[++++ = complete hæmolysis; +++ = almost complete hæmoloysis; ++ = weak hæmolysis; + = traces of hæmolysis; — = no hæmolysis; Ag = agglutination.]

Patient's No.	Name.	Sex.	Age.	Duration of treatment.	Amount of serum.	Results.					Remarks.
						15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.	
			Years.	*Days.*	*cc.*						
1	P. A	Female	60	1	0.3	++++	++++	++++	++++	++++	
					0.1	—	—	—	—	—	
					0.05	—	—	—	—	—	
					0.01	—	—	—	—	—	
2	J. C	Male	43	0	0.3	++	++++	++++	++++	++++	
					0.1	—	—	—	—	—	Ag.
					0.05	—	—	—	—	—	
					0.01	—	—	—	—	—	
3	J. A	do	38	0	0.3	—	+	+	----------	++	
					0.1	—	—	—	----------	—	
					0.05	—	—	—	----------	—	
					0.01	—	—	—	----------	—	
4	E. M	do	36	1	0.3	++	++++	++++	----------	++++	
					0.1	—	—	—	----------	++	
					0.05	—	—	—	----------	—	
					0.01	—	—	—	----------	—	
5	R. B	do	29	1	0.3	+	++	++	----------	+++	
					0.1	—	—	—	----------	—	Ag.
					0.05	—	—	—	----------	—	Ag.
					0.01	—	—	—	----------	—	

TABLE 5.—*Showing the results of normal antirabbit hæmolysin in the blood serum of the patients at the beginning of the antirabic treatment*—Continued.

Patient's No.	Name.	Sex.	Age.	Duration of treatment.	Amount of serum.	Results.					Remarks.
						15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.	
			Years.	*Days.*	*cc.*						
					0.3	++++	++++	++++	++++	++++	
					0.1	—	—	—	—	—	
6	A. H.	do	29	1	0.05	—	—	—	—	—	
					0.01	—	—	—	—	—	
					0.3	—	—	+++	++++	++++	
					0.1	—	—	—	—	—	
7	D. O.	do	49	0	0.05	—	—	—	—	—	
					0.01	—	—	—	—	—	
					0.3	++	++++	++++	++++	++++	
					0.1	—	—	—	—	—	Ag.
8	L. B.	do	21	2	0.05	—	—	—	—	—	Ag.
					0.01	—	—	—	—	—	

TABLE 6.—*Showing the results of normal antirabbit hæmolysin in the blood serum of the patients at the end of the treatment.*

[++++ = complete hæmolysis; +++ = almost complete hæmolysis; ++ = weak hæmolysis; + = traces of hæmolysis; — = no hæmolysis; Ag = agglutination.]

Patient.	Amount of serum.	Results. 15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.	Remarks.
	cc.						
L. C.	0.3	++	++++	++++	++++	++++	
	0.1	—	—	—	—	—	
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	
P. G.	0.3	+	+	+	--------	+++	
	0.1	—	—	—	--------	—	
	0.05	—	—	—	--------	—	
	0.01	—	—	—	--------	—	
M. R.	0.3	++	++++	++++	++++	++++	
	0.1	—	—	—	—	—	Ag.
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	
C. A.	0.3	+++	+++	+++	++++	++++	
	0.1	—	—	—	—	—	
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	
J. C.	0.3	++	+++	+++	+++	+++	
	0.1	—	—	—	—	—	
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	
E. M.	0.3	+++	++++	++++	--------	++++	
	0.1	—	—	—	--------	—	
	0.05	—	—	—	--------	—	
	0.01	—	—	—	--------	—	
L. B.	0.3	—	++	+++	+++	+++	
	0.1	—	—	—	—	—	Ag.
	0.05	—	—	—	—	—	Ag.
	0.01	—	—	—	—	—	
D. O.	0.3	—	++	+++	+++	+++	
	0.1	—	—	+	+	+	
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	
R. C.	0.3	+	+++	++++	++++	++++	
	0.1	—	+	+	+	+	
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	
V. R.	0.3	++	+++	++++	++++	++++	
	0.1	—	—	—	—	—	
	0.05	—	—	—	—	—	
	0.01	—	—	—	—	—	

TABLE 7.—*Showing the results of normal antisheep hæmolysin in the blood serum of the patients.*

[++++ = complete hæmolysis; +++ = almost complete hæmolysis; ++ = weak hæmolysis; + = traces of hæmolysis; — = no hæmolysis.]

Patient.	Sex.	Age.	Duration of treatment.	Amount of serum.	Amount of physiolcgical salt solution.	Results.							
						15 min.	30 min.	45 min.	1 hr.	1.25 hrs.	1.5 hrs.	1.75 hrs.	2 hrs.
		Years.	*Days.*	*cc.*									
M. L.	Male	18	18	0.3	0.7	++++	++++	++++	++++	++++	++++	.....	++++
				0.1	—	—	++	++	+++	+++	+++	.....	+++
				0.05	0.5	—	—	—	—	—	—	.....	+
				0.01	0.9	—	—	—	—	—	—	.....	—
I. L.	do.	39	17	0.3	0.7	+++	++++	++++	++++	++++	++++	.....	++++
				0.1	—	—	—	—	—	—	—	.....	—
				0.05	0.5	—	—	—	—	—	—	.....	—
				0.01	0.9	—	—	—	—	—	—	.....	—
J. R.	do.	42	12	0.3	0.7	+	+++	+++	+++	+++	+++	.....	++++
				0.1	—	—	—	—	—	—	—	.....	—
				0.05	0.5	—	—	—	—	—	—	.....	—
				0.01	0.9	—	—	—	—	—	—	.....	—
S. R.	do.	41	3	0.3	0.7	—	—	+	+	+	+	+	++
				0.1	—	—	—	—	—	—	—	—	—
				0.05	0.5	—	—	—	—	—	—	—	—
				0.01	0.9	—	—	—	—	—	—	—	—
R. C.	do.	33	7	0.3	0.7	++++	++++	++++	++++	++++	++++	++++	++++
				0.1	—	+	+	++	++	++	++	++	++
				0.05	0.5	—	—	—	—	—	+	+	+
				0.01	0.9	—	—	—	—	—	—	—	—

C. V	Female	57	11	0.3	0.7	+	++	+++	+++	+++	+++	++++	++++
				0.1	—	—	—	—	—	—	—	—	—
				0.05	0.5	—	—	—	—	—	—	—	—
				0.01	0.9	—	—	—	—	—	—	—	—
R. C	Male	33	25	0.3	0.7	+++	+++	+++	+++	+++	+++	+++	+++
				0.1	—	++	++	++	++	++	++	++	++
				0.05	0.5	—	+	+	+	+	+	+	+
				0.01	0.9	—	—	—	—	—	—	—	—
P. S	do	45	12	0.3	0.7	+++	++++	++++	++++	++++	++++	++++	++++
				0.1	—	+	+	+	+	+	+	+	+
				0.05	0.5	—	—	—	—	—	—	—	—
				0.01	0.9	—	—	—	—	—	—	—	—
S. R	do	41	21	0.3	0.7	+	+	+	+	+	+	+	+
				0.1	—	—	—	—	—	—	—	—	—
				0.05	0.5	—	—	—	—	—	—	—	—
				0.01	0.9	—	—	—	—	—	—	—	—
F. M	do	26	13	0.3	0.7	++	+++	++++	++++	++++	++++	++++	++++
				0.1	—	—	—	+	+	++	++	++	++
				0.05	0.5	—	—	—	—	—	—	—	—
				0.01	0.9	—	—	—	—	—	—	—	—

AGGLUTINATION OF RABBIT RED CORPUSCLES BY THE HUMAN SERUM DURING ANTIRABIC TREATMENT

This test was performed in the same manner as described above under hæmolysis, but inactivated serum was used. The results are given in Tables 8 and 9. No difference was noticed in the contents in the patient's blood of normal agglutinins, when tested in the beginning and at the end of the preventive treatment against hydrophobia.

TABLE 8.—*Showing the results of agglutination test of rabbit red corpuscles by the patients' sera at the beginning of the antirabic treatment.*

[++++ = complete agglutination; +++ = almost complete agglutination; ++ = weak agglutination; + = traces of agglutination.]

Patient's No.	Name.	Sex.	Age.	Duration of treatment.	Amount of serum.	Results.				
						15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.
			Years.	*Days.*	*cc.*					
1	P. A	Male	60	1	0.3	-------	-------	++++	++++	-------
					0.1	-------	-------	+	++	-------
					0.05	-------	-------	—	+	-------
					0.01	-------	-------	—	—	-------
2	J. C	do	43	0	0.3	-------	-------	++++	++++	++++
					0.1	-------	-------	+	+	++
					0.05	-------	-------	—	—	+
					0.01	-------	-------	—	—	—
3	J. A	do	38	0	0.3	+	-------	-------	-------	++++
					0.1	—	-------	-------	-------	—
					0.05	—	-------	-------	-------	—
					0.01	—	-------	-------	-------	—
4	E. M	do	36	1	0.3	—	+	+++	+++	+++
					0.1	—	—	+++	+++	+++
					0.05	—	—	—	—	—
					0.01	—	—	—	—	—
5	R. B	do	29	1	0.3	+	++	++++	++++	++++
					0.1	—	++	++++	++++	++++
					0.05	—	—	—	—	—
					0.01	—	—	—	—	—
6	A. H	Female	29	1	0.3	—	+++	++++	++++	++++
					0.1	—	++	++	++	++
					0.05	—	—	—	—	—
					0.01	—	—	—	—	—
7	D. O	Male	49	0	0.3	—	—	+	+	+
					0.1	—	—	—	—	—
					0.05	—	—	—	—	—
					0.01	—	—	—	—	—
8	L. B	do	21	2	0.3	+	+++	-------	++++	++++
					0.1	—	+++	-------	++++	++++
					0.05	—	++	-------	++++	++++
					0.01	—	—	-------	—	—

TABLE 9.—*Showing the results of agglutination test of rabbit red corpuscles by the patients' sera at the end of the treatment.*

[++++ = complete agglutination; +++ = almost complete agglutination; ++ = weak agglutination; + = traces of agglutination.]

Patient.	Amount of serum.	Results.				
		15 min.	30 min.	1 hr.	1.5 hrs.	2 hrs.
	cc.					
L. C	0.3	----------	----------	++++	++++	++++
	0.1	----------	----------	+	+	++
	0.05	----------	----------	—	—	+
	0.01	----------	----------	—	—	—
P. G	0.3	—	—	+	++	++
	0.1	—	—	+	+	+
	0.05	—	—	—	—	—
	0.01	—	—	—	—	—
M. R	0.5	++	++++	++++	++++	++++
	0.3	++	+++	++++	++++	++++
	0.1	—	++	++++	++++	++++
	0.05	—	++	+++	+++	+++
	0.01	—	—	—	—	—
C. A	0.3	+++	++++	++++	++++	++++
	0.1	—	+++	+++	++++	++++
	0.05	—	++	++	++	+++
	0.01	—	—	—	—	—
J. C	0.3	+++	++++	++++	++++	++++
	0.1	++	+++	+++	++++	++++
	0.05	—	—	+	++	++
	0.01	—	—	—	—	—
E. M	0.3	—	++	+++	----------	++++
	0.1	—	—	+	----------	+++
	0.05	—	—	—	----------	+
	0.01	—	—	—	----------	—
L. B	0.3	+	+++	++++	++++	++++
	0.1	—	++	+++	++++	++++
	0.05	—	+	+	++	++
	0.01	—	—	—	—	—
D. O	0.3	+++	++++	++++	++++	++++
	0.1	—	—	—	—	—
	0.05	—	—	—	—	—
	0.01	—	—	—	—	—
R. C	0.3	+	+++	++++	++++	++++
	0.1	—	+	++	++	++
	0.05	—	—	—	—	—
	0.01	—	—	—	—	—
V. R	0.3	++	++++	++++	++++	++++
	0.1	—	++	++++	++++	++
	0.05	—	—	++	++	++
	0.01	—	—	—	—	—

COMPLEMENT-FIXATION TEST FOR THE PRESENCE OF ANTIBODIES TO RABBIT PROTEIN IN PATIENT'S SERUM

TECHNIC

Antigen.—About 6 cubic centimeters of blood were withdrawn from a rabbit and the blood was placed in a sterilized test tube and allowed to stand until the serum was separated from the blood clot. The serum was decanted, inactivated at 56° C. on a water bath for thirty minutes, and placed in a refrigerator.

Patient's serum.—Serum was obtained from the patient's vein by using a sterile syringe, and after the serum separated it was inactivated and kept in a refrigerator.

Complement.—About 4 cubic centimeters of blood were withdrawn from each guinea pig's heart, and the clear serum was diluted in a 1 : 10 dilution with the physiological salt solution.

Hæmolytic system.—A 5-per-cent suspension of monkey washed blood corpuscles was sensitized with two units of amboceptor at room temperature (about 28° C.) for one hour.

ARRANGEMENT OF EXPERIMENT

Three test tubes for each patient's serum and one test tube for antigen control were arranged in a rack.

Two-tenths cubic centimeter of rabbit serum was placed in the first, second, and fourth test tubes.

Two-tenths cubic centimeter of saline solution was placed in the third test tube.

Inactivated patient's serum was placed in the first, second, and fourth test tubes. The first test tube received 0.2 cubic centimeter, the second test tube 0.1 cubic centimeter, and the third test tube 0.2 cubic centimeter of patient's serum.

Each tube received enough of the saline solution to make the total amount 1 cubic centimeter.

Five-tenths cubic centimeter of a 10-per-cent complement was added to each test tube, and the tubes were stirred thoroughly and kept in the incubator.

After one hour's incubation 1 cubic centimeter of sensitized monkey blood corpuscles suspension was added to each test tube.

Incubation for an hour followed.

The results were read and noted.

The results are evident from Table 10. This test indicates that traces of antirabbit antibodies are present in the blood of patients at the end of the antirabic treatment.

TABLE 10.—*Showing the results of the complement fixation test for anti-rabbit protein in the blood serum of the patients at the end of the antirabic treatment.*

Patient.	Sex.	Age.	Number of injections received.	Amount of rabbit serum.	Amount of patient's inactive serum.	Amount of complement	Amount of R. C. +2 units.	Amount of physiological salt solution	Result registered as inhibition
		Years.		*cc.*	*cc.*		*cc.*		
C. G	Male	15	25	0.2	0.2	0.5	1	0.6	±
				0.2	0.1	0.5		0.7	—
				—	0.2	0.5		0.8	—
				0.2	—	0.5		0.8	—
T. S	do	24	21	0.2	0.2	0.5	1	0.6	—
				0.2	0.1	0.5		0.7	—
				—	0.2	0.5		0.8	—
M. L	do	18	7	0.2	0.2	0.5	1	0.6	±
				0.2	0.1	0.5		0.7	—
				—	0.2	0.5		0.8	—
J. L	do	20	20	0.2	0.2	0.5	1	0.6	++
				0.2	0.1	0.5		0.7	—
				—	0.2	0.5		0.8	—
J. T	do	21	20	0.2	0.2	0.5	1	0.6	+
				0.2	0.1	0.5		0.7	—
				—	0.2	0.5		0.8	—
				0.2	—	0.5		0.8	—
P. D	Female	40	20	0.2	0.2	0.5	1	0.6	±
				0.2	0.1	0.5		0.7	
				—	0.2	0.5		0.8	—
				0.2	—	0.5		0.8	—
C. A	Male	62	20	0.2	0.2	0.5	1	0.6	+
				0.2	0.1	0.5		0.7	+
				—	0.2	0.5		0.8	—
				0.2	—	0.5		0.8	±
J. C.	do	38	20	0.2	0.2	0.5	1	0.6	+
				0.2	0.1	0.5		0.7	+
				—	0.2	0.5		0.8	—
E. M	do	36	20	0.2	0.2	0.5	1	0.6	+
				0.2	0.1	0.5		0.7	+
				—	0.2	0.5		0.8	—
L. B	do	21	20	0.2	0.2	0.5	1	0.6	—
				0.2	0.1	0.5		0.7	—
				—	0.2	0.5		0.8	—
				0.2	—	0.5		0.8	—

CONCLUSIONS

1. The hæmolytic power toward guinea pig red corpuscles of the patient's serum is not affected by the antirabic treatment.

2. The amount of the antirabbit hæmolysin in human serum is not influenced by the treatment against hydrophobia.

3. The antisheep hæmolysin in normal human serum is not influenced by antirabic treatment.

4. The titer of normal human serum with regard to agglutination of guinea pig and rabbit red cells is not altered by antirabic treatment.

5. Toward the end of the Pasteur treatment the patient's serum gives positive complement fixation with rabbit protein to a very slight degree.

ACKNOWLEDGMENT

Thanks are due to Dr. Otto Schöbl, chief of the division of biology and serum laboratory, Bureau of Science, for valuable assistance in carrying out this work.

OBSERVATIONS ON THE DEVELOPMENT OF ASCARIS OVA

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Postmortems in Zamboanga on five hundred Christian Filipinos more than 1 year old and two hundred twenty-six Christian Filipino infants 1 year and under in age show thirteen (average age, 4 years) and four deaths, respectively, due to ascariasis. Two cases of the former group had perforation of the intestine (with hepatic migration in one) due to the worms, followed by generalized suppurative peritonitis. The other cases died of ascaris toxæmia. Among one hundred forty-five worm counts from these postmortems it was found that the highest incidence and heaviest infestations were recorded in the 1-to-5-year age group in which there were thirty-nine cases, or 27 per cent, with a per capita count of twenty-five worms.

The following observations on ascaris ova are along similar lines and have the same object as those by Wharton [1] eleven years ago; namely, to obtain some knowledge of their development and of the mode of infection upon which prophylaxis might be based.

The ova were collected principally from female ascarids obtained at postmortem, and some from chenopodium-treatment stools. The worms were placed, one each (in order to oviposit regularly), in a Petri dish with some Kronecker fluid (1,000 cubic centimeters physiological salt solution plus 1 cubic centimeter normal sodium hydroxide) and left at room temperature (25 to 30° C.), away from direct sunlight. The eggs were collected every day by pouring the Kronecker fluid into a cylinder and allowing the eggs to settle. The eggs tend to cohere and form lumps which settle easily. By changing the Kronecker fluid daily the worms remain alive and deposit eggs for as long as ten days. The tests were begun on the day of oviposition, whenever possible, or the following day, if delivered at night. In some tests pooled ova from different females were used.

[1] Philip. Journ. Sci. § B 10 (1915) 19.

Unless otherwise stated, the medium used was Kronecker fluid. All observations were made daily whenever necessary. In longevity tests weekly observations were sufficient.

To determine the viability of the larvæ, motility was depended upon mainly. If no larvæ moved after one minute of observation (using either $\frac{2}{3}$ or $\frac{1}{6}$ objective) the slide was placed in the incubator for five minutes or slightly warmed over the light of a cigar. The heat stimulated movement. Granulation, shrinkage, and vacuolation indicated dead larvæ. The tests were carried out in test tubes and on slides, without cover glass, and these were kept in moist chambers consisting of a Petri dish with constantly wet filter paper in the bottom. In test-tube observations care was taken not to traumatize larvated ova in transferring them from the tube to the slide.

Each test was carried out on at least two batches of ova from different females, or pooled ova from several of them. The 2-cell stage appeared as early as the third day and as late as the eighth day after delivery when kept under favorable conditions (average, fifth day); the 4- to 8-cell stages the seventh day; and the kidney-shaped, or prelarval, stage the eighth or ninth day.

The observations were carried out from March to September. In the following summaries are given the results of the observations.

NORMAL LARVAL DEVELOPMENT TIME

In six tests on ova from different female worms kept in Kronecker fluid on slides in a moist chamber, the ova developed into motile larvæ in from nine to fifteen days at room temperature.

EFFECT OF HEAT, DESICCATION, AND SUNLIGHT

1. Five to ten minutes immersion in the water bath at 50° C. did not prevent larval development. Five minutes at 55° C. prevented larval development in two batches of eggs but not in another.

2. Drying on a Petri dish at room temperature and with humidity did not prevent larval development. The larvæ developed in from twelve to fifteen days.

3. Ova dried on a Petri dish at room temperature and with humidity, transferred weekly on slides with a drop of Kronecker fluid and kept in the moist chamber, showed living larvæ on the

twenty-first day of drying; few remained motile thirty-four days thereafter, or fifty-five days from the time they began to dry.

4. Ova mixed with dry sand and transferred weekly to the moist chamber showed the same result as in 3.

5. Dried ova on a glass slide exposed to direct sunlight for a half hour were not killed; but one and a half hours' exposure completely prevented larval development.

6. Ova suspended in a drop of Kronecker fluid on a slide in the moist chamber developed when exposed to direct sunlight for one hour. At two hours' exposure and longer there was no development. No retardation of development was noted in the drying or the sun-exposure tests.

7. Ova allowed to dry on a Petri dish and placed in a desiccator for one week, when transferred into Kronecker fluid and kept in a wet chamber developed into larvæ twenty-one days after transfer into the chamber. Few larvæ maintained motility twenty-seven days thereafter. When kept more than two weeks in the desiccator the ova no longer developed into motile larvæ; evidence of attempts to larvate were seen, however.

ANAËROBIOSIS

1. In some batches of ova larvæ developed more quickly when they were placed on a slide in the moist chamber than in the same batch placed at the bottom of a test tube under a tall column of Kronecker fluid, the difference being from fifteen to nineteen days. In others the development time was the same, while in one batch they were observed to develop much more quickly in the test tube than on the slide in the moist chamber, the difference being thirteen days.

2. Test ova under cover glass showed retarded larval formation in the middle area. The nearer the ova to the edge the faster the development.

3. Ova, placed in a test tube with a column of 1.5 inches of boiled and cooled Kronecker fluid, overlain with 1 inch of paraffine oil, and corked tightly, developed into motile larvæ in twenty-two days.

4. When the ova of the batch in the Kronecker fluid were placed under a mixture of pyrogallic acid and sodium hydroxide in a cotton plug and tightly corked, no larvæ developed after ninety-nine days. Transfer of the ova into the moist chamber showed motile larvæ on the eighth day after transfer.

EFFECTS OF VARIOUS SUBSTANCES

1. Ova placed in different concentrations of table salt, 5 to 25 per cent in water, developed into larvæ in all of them in from twelve to sixteen days, but were seen motile in only 1- to 10-per-cent solutions in one series of tests, and up to 15 per cent in another series. The larvæ in the higher concentrations were contracted and granular.

2. Ova placed in pure Chinese sauce (toyo) did not develop. Ova placed in 50-per-cent solution of this sauce in water showed larval development in a few, but the larvæ were granular, vacuolated, and not motile.

3. Ova placed in different dilutions of glacial acetic acid, 2 to 10 per cent, all developed into larvæ in twenty days, but motile ones were noted only in solutions up to 6 per cent. The larvæ were granular in the higher dilutions.

4. Ova placed in pure and in 50-per-cent solutions in water of vinegar purchased at a grocery developed into motile larvæ, but only a few remained motile for four months and one week. The larvæ in pure vinegar began to show vacuoles after this time. At the end of five months no motile larvæ were seen, although the larvæ in the 50-per-cent solution appeared healthy (neither granular nor vacuolated).

5. Ova were placed in varying sugar solutions, from 5 to 50 per cent, in test tubes. Motile larvæ were present in all in twenty days.

6. Ova in dilutions of 0.1 to 2 per cent of formalin (commercial) developed in twelve days and the larvæ were still motile in the 2-per-cent solution after one month. Larval formation was slow in the 0.1-per-cent solution.

7. Ova placed in alcohol, 1 to 5 per cent, solution in water developed into motile larvæ in twenty days, except those in the 1 per cent, which developed one month later. The larvæ were still motile in 2- to 5-per-cent dilutions twenty-seven days after their appearance. It was noted that larval development was more rapid in the 4- and the 5-per-cent solutions than in the 2- and the 3-per-cent solutions.

8. Ova placed in 0.1- to 0.5-per-cent solutions of normal sodium hydroxide all developed into motile larvæ in twelve days.

9. Ova placed in 0.1- to 0.5-per-cent solutions of hydrochloric acid developed in all in sixteen days. Larvæ in 0.1- and 0.2-per-cent solutions were still motile twenty-seven days after their

appearance. Those in higher dilutions were granular and not motile.

OTHER OBSERVATIONS

1. Ova placed in stool, in urine, and in a mixture of urine and stool on slides in the moist chamber showed motile larvæ in all on the ninth day.

2. Abnormally large ova, four or more times as large as the normal ova, were frequently seen. These developed into correspondingly large single larvæ. Ova from females expelled by chenopodium treatment behaved in the same manner as those from postmortem.

3. Ova placed in Kronecker fluid and distilled water in a test tube which developed into motile larvæ were still motile after six months.

4. Putrefaction in Kronecker fluid prevented formation of larvæ when others of the same batch of eggs without putrefaction larvated in fifteen days. When the Kronecker fluid was changed the ova developed in fifteen days.

5. The presence or absence of the albuminous coating of the egg did not seem to influence the larval formation under different conditions.

6. Spontaneous hatching was not noted in any of these tests. Very rarely in pipetted samples, or when adjusting a cover glass, an ovum would break and liberate a motile larva.

7. Ova four months old with motile larvæ were placed in duodenal and ileal contents from three very fresh cadavers (within one hour after death) and kept in an incubator, with the occasional addition of small amounts of sterile saline to replace evaporation. After two weeks, the larvæ were still motile in the shell but they did not hatch.

8. In 0.2-per-cent solutions of hydrochloric acid and sodium hydroxide, four-month-old larvæ were left at room temperature for one month, during which time they remained alive but did not hatch.

COMMENTS

It is an admitted fact that the origin of ascaris infections is food, drink, fresh fruit or, in case of infants and children, whatever object might contain the larvated ascaris ova of human fæcal origin.

In view of the time necessary for full-grown larvæ to develop (nine to fifteen days), the ingested ova must have full-grown

larvæ in order to be infectious; otherwise the ova will pass out in the stool. According to Ohba [2]—

> The eggs of Ascaris lumbricoides develop the greatest ability to infect experimental animals in from 8 to 10 days after the formation of the embryo.

If this be applicable to man it means that the ova-containing stool should have been outside the body, on the average, two to three weeks before the ova could infect.

My preliminary tests on the hatching of ascaris eggs gave negative results and therefore need further observation.

Wharton was not able to hatch embryos with any degree of regularity and thought his failure to do so was due to faulty technic.

Martin,[3] working on the eggs of ascaris from calf, pig, horse, and dog, conclusively proved that the embryos of these ascarids hatch best in alkaline solutions and that, when developed eggs are introduced into the alimentary canal of an animal, they pass through the stomach unaffected and only hatch after they have been subjected to the action of the alkaline juices in the intestine. He found also that none of the juices of the alimentary canal are able to digest the chitinous layers of the shell, that the embryos always emerge through a V-shaped opening which appears in the end of the shell, and that the shell passes out, undigested, with the fæces. He is of the opinion that the hatching is due to stimulation of the embryos by the alkaline substances in the intestine and by the increase in temperature, and not to any action of the juices on the structure of the shell. He found, also, in the cases of the embryos of the calf and of the pig ascaris, that it was necessary for the embryos to be completely developed before being fed to an animal, or placed in artificial juices, at 37° C., as any embryos which were not completely developed were killed by the rise in temperature. The ascarids of the horse and dog were able to undergo their complete development and hatch in artificial pancreatic juice at a temperature of 37° C.

Ohba found—

> spontaneous hatching in the culture and the larvae may live therein. Incubated for five or six hours at 38° C. in 0.2% hydrochloric acid,

[2] Journ. Med. Assoc. of Formosa (1923) 228, summarized in Tropical Diseases Bull. 20, No. 12 (1923).

[3] Ann. Sci. Nat. (1913) Nos. 2 and 3. Cited by Wharton in Philip. Journ. Sci. § B 10 (1915) 22.

0.2% Na_2CO_3, artificial gastric juice or artificial intestinal juice the eggs do not hatch, but if left in these solutions for much longer periods hatching occurs. The rate of hatching is slow and indefinite when the direct mechanical action of the movement of the bowel is eliminated.

Asada [4] found hatching when embryo-containing eggs were injected into the intestine of experimental animals.

CONCLUSIONS

The noted resistance of ascaris ova to drying under ordinary temperature and humidity, the relative resistance to direct sunlight, the impermeability of the eggshell to high concentrations of common food condiments (salt, vinegar, and sugar) the long life of the larva in shell aided by favorable climatic conditions, poor or careless sewage disposal and probably other conditions (mechanical carriage by domestic animals, topography of locality, etc.), all favor or explain the high incidence of ascaris. The rôle of hog ascaris in human infestation has not yet been definitely settled.

The proper disposal of human waste and the periodic treatment of cases, particularly in children, seem to be the most practical solutions.

[4] Summarized in Japan Medical World 2 No. 11 (1922) 323.

SALTS OF LINOLENIC HEXABROMIDE (CALCIUM, MAGNESIUM, STRONTIUM, AND NICKEL) FROM PHILIPPINE LUMBANG OIL

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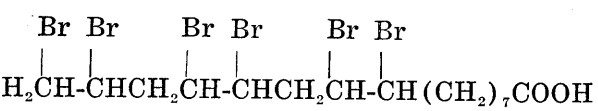
The efficiency of a vegetable drying oil depends principally upon the amount of linolenic and linolic glycerides contained in the oil. These substances are the particular compounds that absorb oxygen from the air and cause the oil to dry.[1] Linolenic glyceride [2] has a greater capacity for the absorption of oxygen than has any of the other compounds contained in drying oils. This glyceride and the corresponding free linolenic acid are, therefore, substances of considerable importance. Although linolenic glyceride and the free linolenic acid are substances which oxidize readily, they may be separated from an oil in the form of a stable hexabromide.[3]



Only a very few derivatives of linolenic hexabromide have ever been prepared. Erdmann and Bedford [4] prepared the potassium and barium salts of the hexabromide and also the methyl and ethyl esters. They did not give the exact experimental details, nor did they state the melting point or the analysis of the salts or give the solubility of these substances in

[1] Lewkowitsch, J., Chemical Technology and Analysis of Oils, Fats, and Waxes 2 (1922) 42.

[2] West, A. P., and A. I. de Leon, Philip. Journ. Sci. 24 (1924) 123.

[3] Lewkowitsch, J., Chemical Technology and Analysis of Oils, Fats, and Waxes 1 (1921) 212.

[4] Ber. Deutsche Chem. Gesell. 42 (1909) 1330.

various solvents. Imperial and West [5] prepared the barium, zinc, and lead salts and determined the melting point and the solubility of these salts in various solvents.

Since very few derivatives of linolenic hexabromide have been prepared, it would seem desirable to make a few more salts of this substance and determine their solubility in various solvents. The data thus obtained may be useful in devising new methods for separating mixtures of linolenic hexabromide and the linolic tetrabromides.

In this investigation, four new salts of linolenic hexabromide were prepared; namely, calcium, magnesium, strontium, and nickel. The melting point and the solubility of each of these salts in various solvents were determined.

EXPERIMENTAL PROCEDURE

Linolenic hexabromide.—Philippine lumbang oil was used as the material for preparing a supply of linolenic hexabromide. Lumbang oil [6] is obtained from the seeds of *Aleurites moluccana*. It consists almost entirely of glycerides of the unsaturated acids; namely, linolenic, linolic, and oleic.[7] It is a drying oil and is used in making paints, varnishes, and similar products.[8] The lumbang oil was pressed from seeds of good quality and filtered first through glass wool and then through filter paper.

Linolenic hexabromide was prepared from lumbang oil in accordance with the procedure adopted by Santiago and West [9] in a recent investigation of lumbang compounds. The lumbang oil was saponified with aldehyde-free alcoholic potassium hydroxide.[10] The mixed potassium salts thus obtained were converted into the mixed acids. The mixed acids were brominated in ether solution according to the procedure used by Imperial and West [11] in preparing linolenic hexabromide. The ether solution of mixed acids was stirred mechanically by means of a hot-air motor and brominated at —10° C. The insoluble linolenic hexabromide was removed by filtering. After crystallizing

[5] Philip. Journ. Sci. 31 (1926) 441.
[6] West. A. P., and W. H. Brown, Bull. P. I. Bur. Forestry 20 (1920) 112.
[7] West, A. P., and Z. Montes, Philip. Journ. Sci. 18 (1921) 619.
[8] West, A. P., and F. L. Smith, Bull. P. I. Bur. Forestry 24 (1923).
[9] Philip. Journ. Sci. 32 (1927) 41.
[10] Dunlap, F. L., Journ. Am. Chem. Soc. 28 (1906) 397.
[11] Philip. Journ. Sci. 31 (1926) 441.

from ethyl acetate and benzene the melting point of the hexabromide was 179.5 to 180.5° C.

Salts of linolenic hexabromide were prepared by first converting the acid into the potassium salt. A normal propyl alcohol solution of the potassium salt was then treated with a normal propyl alcohol solution of an inorganic salt such as calcium bromide. The precipitated salt thus obtained was purified, and the melting point and the solubility in various solvents were determined. It was necessary to use very dilute solutions in preparing these salts, because neither the linolenic hexabromide nor the potassium salt of the hexabromide is very soluble in the ordinary organic solvents.

Potassium salt of linolenic hexabromide.—Ten grams of linolenic hexabromide were dissolved in about 3 liters of hot normal propyl alcohol. This solution was filtered and to the clear solution was added an excess of the calculated amount of a hot ethyl alcohol solution of potassium hydroxide. A white gelatinous precipitate of the potassium salt was formed immediately. The mixture was heated (reflux) on a water bath for about five hours to complete the reaction and obtain a clear supernatant solution. The mixture was then cooled and the precipitate separated from the clear supernatant liquid by filtering. The potassium salt was washed thoroughly with ethyl alcohol (95 per cent), and then washed with ether. It was placed on filter paper and dried in a vacuum desiccator. The salt was further purified by washing with hot benzene to dissolve any unchanged hexabromide that might be present. It was again washed with alcohol and ether, placed on filter paper, and dried in a vacuum desiccator.

Calcium salt of linolenic hexabromide.—Five grams of the potassium salt were dissolved in about 3 liters of hot normal propyl alcohol and filtered to eliminate the slight turbidity. A solution of calcium bromide ($CaBr_2$) was prepared by treating a gram of the salt with 5 cubic centimeters of water and adding about 100 cubic centimeters of normal propyl alcohol. This solution of calcium bromide was heated and added to the hot solution of the potassium salt previously prepared. A white precipitate was formed immediately. The mixture was heated (reflux) on a water bath for about five hours to complete the reaction as indicated by the clear supernatant liquid. The mixture was cooled, and the salt removed by filtering. The salt

was washed with ethyl alcohol (50 per cent) until free of adhering calcium and potassium bromides as indicated by the silver nitrate test of the washings. The salt was then washed with alcohol (95 per cent), placed on filter paper, and dried in a vacuum desiccator. A second yield was obtained by distilling the filtrate to about a fourth of the original volume and allowing the solution to crystallize.

A melting-point determination showed that the salt turned brown at 208° C. and decomposed completely at 218° C., giving a black mass.

The formula of the salt was checked by determining the calcium as sulphate. A portion of the salt was treated with concentrated sulphuric acid and the calcium converted into calcium sulphate.

Analysis:

	Calcium. Per cent.
Calculated for $C_{36}H_{58}Br_{12}O_4Ca$	2.58
Found	2.52

Magnesium salt of linolenic hexabromide.—The potassium salt (5 grams) was dissolved in 3 liters of hot normal propyl alcohol and the solution filtered. A hot solution of magnesium bromide ($MgBr_2.6H_2O$) was prepared by dissolving 1.5 grams of the salt in 5 cubic centimeters of water and then adding 100 cubic centimeters of normal propyl alcohol. This solution was then added to the hot alcohol solution of the potassium salt previously prepared. The white magnesium salt was precipitated immediately. The mixture was heated (reflux) on a water bath for about five hours to complete the reaction as indicated by the clear supernatant liquid. The magnesium salt was then removed by filtering and washed with ethyl alcohol (50 per cent) to dissolve the excess magnesium bromide and also the potassium bromide formed in the reaction. The salt was then washed with alcohol (95 per cent), placed on filter paper, and dried in a vacuum desiccator. A second yield was obtained by concentrating the filtrate to about a fourth of the original volume.

The determination of the melting point showed that the salt began to turn brown at 203° C., and decomposed to a black mass at 208° C.

The salt was analyzed by converting the magnesium into magnesium oxide. A few drops of concentrated nitric acid were added to the impure residue of magnesium oxide contained in a crucible in order to hasten the oxidation of the carbon. The

residue was then heated until the nitric acid was entirely volatilized and ignited until white.

Analysis:

	Magnesium. Per cent.
Calculated for $C_{36}H_{58}Br_{12}O_4Mg$	1.58
Found	1.77

Strontium salt of linolenic hexabromide.—Five grams of the potassium salt were dissolved in about 3 liters of hot normal propyl alcohol and the solution was filtered. A solution of strontium chloride ($SrCl_2.6H_2O$) was prepared by dissolving 1.2 grams of the salt in 5 cubic centimeters of water and adding about 100 cubic centimeters of normal propyl alcohol. This strontium chloride solution was heated and added to the hot solution of the potassium salt previously prepared. A white precipitate was formed immediately. The mixture was heated (reflux) on a water bath until the supernatant liquid was clear, showing that the reaction was completed. This required about five hours. The mixture was cooled and the precipitated strontium salt removed by filtering. The salt was washed with ethyl alcohol (50 per cent) until free of chlorides. It was then washed with ethyl alcohol (95 per cent), placed on filter paper, and dried in a vacuum desiccator. A second yield of the strontium salt was obtained by concentrating the filtrate from the first crop and allowing it to crystallize.

When the melting point was determined the salt began to turn brown at 205° C., and it decomposed completely at 219° C.

The salt was analyzed by determining the strontium as strontium sulphate.

Analysis:

	Strontium. Per cent.
Calculated for $C_{36}H_{58}Br_{12}O_4Sr$	5.47
Found	5.34

Nickel salt of linolenic hexabromide.—The nickel salt was prepared, purified, and analyzed by the same method employed in making the other salts. A hot normal propyl alcohol solution of the potassium salt (5 grams in 3 liters) was treated with a normal propyl alcohol solution of nickel bromide ($NiBr_2$) containing about 1 gram of nickel bromide. A white precipitate with a slight greenish tint was formed immediately. The mixture was heated (reflux) on a water bath for about five hours to complete the precipitation. The precipitate was filtered off and washed first with ethyl alcohol (50 per cent) and then with

ethyl alcohol (95 per cent). The salt was then placed on filter paper and dried in a vacuum desiccator.

When the melting point was determined the salt melted incompletely with decomposition at between 209 and 212° C.

The salt was analyzed by converting the nickel into nickel oxide (NiO).

Analysis:

	Nickel. Per cent.
Calculated for $C_{36}H_{58}Br_{12}O_4Ni$	3.73
Found	3.84

Melting point.—A determination of the melting point of the salts that were prepared showed that all of them decomposed when heated to a sufficiently high temperature. According to the literature [12] a number of salts of long-chain aliphatic acids do not give a sharp melting point. The results of the melting-point determinations obtained in this research are quite similar to those recorded in the literature.

TABLE 1.—*Solubility of salts of linolenic hexabromide.*

[I = insoluble; ss = slightly soluble; S = soluble.]

Solvent	Potassium salt.		Calcium salt.		Strontium salt.		Magnesium salt.		Nickel salt.	
	Cold.	Hot.	Cold.	Hot.	Cold.	Hot.	Cold.	Hot.	Cold.	Hot.
Acetone	I	ss	I	I	I	I	I	I	I	I
Amyl alcohol	I	ss	ss	ss	ss	ss	ss	ss	ss	ss
Benzene	I	I	ss	ss	ss	ss	ss	ss	ss	ss
Carbon tetrachloride	I	I	I	I	I	I	ss	ss	ss	ss
Chloroform	I	I	ss	ss	ss	I	ss	ss	ss	ss
Ether	I	I	I	I	I	I	I	I	I	I
Ethyl acetate	I	ss	I	I	I	I	I	I	I	I
Ethyl alcohol	ss	ss	I	I	I	I	I	I	ss	ss
Ethyl benzoate	I	ss	ss	ss	ss	ss	ss	ss	ss	ss
Ethyl bromide	I	I	ss	ss	ss	ss	ss	ss	ss	ss
Isopropyl alcohol	ss	ss	ss	ss	ss	ss	ss	ss	ss	ss
Methyl alcohol	ss	ss	I	I	I	I	I	I	I	I
Petroleum ether	I	I	I	I	I	I	I	I	ss	ss
Propyl alcohol (*n*)	ss	S	ss	ss	ss	ss	ss	ss	ss	ss
Toluene	I	I	ss	ss	ss	ss	ss	ss	ss	ss
Xylene	I	I	ss	ss	ss	ss	ss	ss	ss	ss

[12] Lewkowitsch, J., Chemical Technology and Analysis of Oils, Fats, and Waxes 1 (1921) 156, 157, 160, 163, 172, 175, 191, 192, 200, 204, 207.

Beilstein's Handbuch der Organischen Chemie, Vierte Auflage, 2 (1920) 361, 369, 372, 374, 395, 396, 466, 473.

Solubility.—Qualitative solubility experiments on the salts that were prepared were made at room temperature (about 30° C. and designated as cold), and also in hot solvents. For low-boiling solvents like acetone, the solubility in hot solution was determined at the boiling temperature of the solvent. With high-boiling solvents, such as ethyl benzoate, the temperature for solubility determination was about 90° C. In reporting the qualitative solubility data, the term "insoluble" or "slightly soluble" is used for solvents that dissolved the salt to the extent of about 1 per cent or less. With the exception of the potassium salt, all of the salts were either insoluble or only slightly soluble in the various solvents used.

Table 1 shows the solubility of salts of linolenic hexabromide in various solvents.

SUMMARY

Four new compounds, derivatives of crystallized linolenic hexabromide, were prepared from Philippine lumbang oil. These new compounds are the calcium, magnesium, strontium, and nickel salts of crystallized linolenic hexabromide.

The potassium salt of linolenic hexabromide was prepared by treating a normal propyl alcohol solution of the free acid with an alcoholic potassium hydroxide solution.

The calcium, magnesium, strontium, and nickel salts of linolenic hexabromide were prepared from the potassium salt.

The melting point of each of these compounds was determined, and the formulas were checked by analysis.

The solubility of calcium, magnesium, strontium, and nickel salts of linolenic hexabromide was determined for a number of solvents.

CHAULMOOGRYL AMINO BENZOIC ACIDS AND CHAULMOOGRA ANILIDES

By SIMEONA SANTIAGO

Of the Bureau of Science, Manila

and

AUGUSTUS P. WEST

Professor of Chemistry, University of the Philippines

Kelbe's [1] reaction for preparing anilides consists in heating an amide, such as acetamide, with an amine base like aniline until there is no further evolution of ammonia gas. The reaction appears to be a rather general one, since it has given good results with various kinds of amine bases, such as aniline, the toluidines, and napthylamine. Recently, at the suggestion of West, this reaction was carried out with the amide of chaulmoogric acid. Chaulmoogranilide and the chaulmoogra toluides [2] were prepared with good results.

In the present investigation two new chaulmoogra anilides were prepared by Kelbe's reaction, and also two chaulmoogryl amino benzoic acids. Our results seem to indicate that the anilides may be prepared rather easily; but chaulmoogryl derivatives of amino benzoic acids are much more difficult to prepare, because the reaction takes place very slowly, even when small quantities of the materials are used. The new compounds prepared in this research will be tested for their therapeutic value. In order to check the formulas of these compounds the nitrogen content was determined. A modification of Meulen's [3] catalytic method was employed for making the nitrogen analyses.

EXPERIMENTAL PROCEDURE

The chaulmoogra oil used in this investigation was kindly presented to us by Dr. G. A. Perkins, of the Philippine Bureau of Health, and was shipped directly to us from the Culion Leper

[1] Ber. Deutsche Chem. Gesell. 16 (1883) 1199.

[2] Herrera-Batteke, P., Philip. Journ. Sci. 32 (1927) 35.

[3] Smith, F. L., and A. P. West, Philip. Journ. Sci. 31 (1926) 265.

Colony. The oil was prepared from the seeds of the Philippine variety of chaulmoogra known as *Hydnocarpus alcalae* C. de Candolle. This is one of the largest of the *Hydnocarpus* seeds and is obtained from Albay Province, Philippine Islands, where it is known locally as *dudu dudu*.

Chaulmoogric acid.—The acid was prepared from the oil in the following manner: Potassium hydroxide (200 grams) was dissolved in a solution consisting of 80 cubic centimeters of water and 800 cubic centimeters of aldehyde-free alcohol. Chaulmoogra oil (600 grams) was added to the alkali solution and the mixture heated (reflux) on a water bath for about four hours. Most of the alcohol was then eliminated by distilling. The residual soaps were then decomposed with dilute sulphuric acid (1 : 4) and the free acids extracted with ether. The ethereal solution was dehydrated with anhydrous sodium sulphate and the ether removed by distilling. The melted acids were then poured into a large crystallizing dish and exposed to the breeze of an electric fan in order to evaporate most of the remaining ether. The residue was then treated with gasoline, which dissolved the chaulmoogric acid and precipitated the resins that are usually present in chaulmoogra oils. A small quantity of anhydrous sodium sulphate was added to render the resins less colloidal in character. The addition of Fuller's earth and Kieselguhr precipitated some of the coloring matter. The mixture was then filtered, and about half the gasoline removed by distilling. In order to make the solution distill evenly, broken glass was added and a current of carbon dioxide was passed through the solution. The solution was then poured into beakers, cooled, and allowed to crystallize. The acid was recrystallized several times from alcohol (95 per cent). The melting point was 68° C.

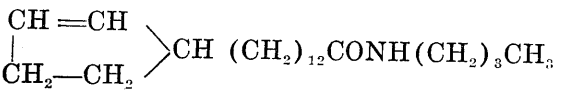
Acid chloride and amide of chaulmoogric acid.—Forty grams of chaulmoogric acid were placed in a flask which was then immersed in hot water until the acid melted. The flask was then connected to a reflux condenser and 4.5 cubic centimeters of phosphorous trichloride were added slowly from a dropping funnel, and the mixture was warmed over a small flame. The reaction was finished in about fifteen minutes. Phosphorous acid separated at the bottom and side of the flask, while the acid chloride remained as a light supernatant liquid. In order to eliminate the phosphorous acid and other impurities the acid chloride was filtered through glass wool and the clear filtrate allowed to drop slowly into cold concentrated ammonia which

was stirred continuously. The amide, which separated as a somewhat yellowish white precipitate, was filtered off and washed with water until the washings were no longer alkaline. The amide was dried on filter paper and dissolved in absolute alcohol, and the solution decolorized with bone black. By crystallizing twice from ethyl alcohol (95 per cent) and twice from toluene, white crystals (melting point, 104 to 105° C.) were obtained. The yield was about 80 per cent.

Analysis:

	Nitrogen. Per cent.
Calculated for $C_{18}H_{33}ON$	5.02
Found	5.01

CHAULMOOGRABUTYLANILIDE

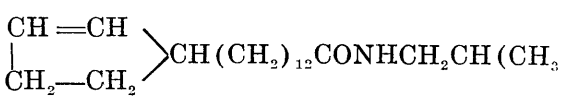


Chaulmoogramide (10 grams) was placed in a flask which was then connected to an air condenser and heated in a crisco oil bath until the amide melted. The amide was treated with 3.9 cubic centimeters of freshly distilled butylamine, which were added slowly from a dropping funnel. The mixture was heated at a temperature of about 170° C. until no more ammonia gas was evolved; this required about two days. The reaction product was crystallized several times from ethyl alcohol (95 per cent) to which a small quantity of bone black was added in order to clarify the solution. The melting point was 100 to 102.5°C., and the yield about 37 per cent of the theoretical yield.

Analysis:

	Nitrogen. Per cent.
Calculated for $C_{22}H_{41}ON$	4.18
Found	4.27

CHAULMOOGRAISOBUTYLANILIDE



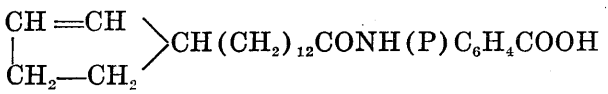
Five grams of chaulmoogramide were melted and treated with 2 cubic centimeters of freshly distilled isobutylamine. The mixture was heated (reflux) in a crisco oil bath at a temperature of about 170° C. until no more ammonia gas was given off; this required about two days. The reaction product was crystallized twice from ethyl alcohol and once from methyl alcohol, using bone black as a decolorizer. The crystals obtained were

somewhat creamy white in color. The melting point was 94.5 to 99° C., and the yield about 45 per cent of the theoretical yield.

Analysis:

	Nitrogen. Per cent.
Calculated for $C_{22}H_{41}ON$	4.18
Found	4.16

CHAULMOOGRYL P-AMINO BENZOIC ACID

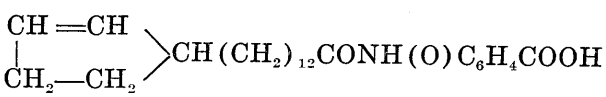


Chaulmoogramide (2.5 grams) was melted and treated with 1.3 grams of *p*-amino benzoic acid. The mixture was heated at a temperature of about 190° C. for four days, until there was no further evolution of ammonia gas. The reaction product was crystallized once from each of the following solvents: Ethyl alcohol (95 per cent), methyl alcohol, and acetone. In using these solvents bone black was used to decolorize the solution. The purified product was obtained as white crystals. When the melting point was determined, the anilide turned slightly brown at 179° C., and melted with decomposition at 188 to 194° C. The yield was about 14 per cent.

Analysis:

	Nitrogen. Per cent.
Calculated for $C_{25}H_{37}O_3N$	3.51
Found	3.54

CHAULMOOGRYL O-AMINO BENZOIC ACID



Two and a half grams of chaulmoogramide were melted and treated with 1.3 grams of *o*-amino benzoic acid. The mixture was heated for four days. The reaction product was dissolved in ethyl alcohol (95 per cent) and the solution treated with bone black to decolorize it. The solution was then allowed to crystallize. After repeating this process several times, creamy white crystals were obtained. A melting-point determination showed that the crystals melt at from 80 to 100° C. with decomposition. The yield was about 33 per cent of the theoretical yield.

Analysis:

	Nitrogen. Per cent.
Calculated for $C_{25}H_{37}O_3N$	3.51
Found	3.61

SUMMARY

Four new chaulmoogra compounds were prepared in this investigation by Kelbe's reaction; namely, chaulmoograbutylanilide, chaulmoograisobutylanilide, chaulmoogryl *p*-amino benzoic acid, and chaulmoogryl *o*-amino benzoic acid.

Chaulmoograbutylanilide was prepared by treating chaulmoogramide with butyl amine. Chaulmoograisobutylanilide was made by the interaction of chaulmoogramide and isobutyl amine. By treating chaulmoogramide with *p*-amino benzoic acid there was obtained chaulmoogryl *p*-amino benzoic acid. Chaulmoogryl *o*-amino benzoic acid was prepared by treating chaulmoogramide with *o*-amino benzoic acid.

Our results indicate that anilides of chaulmoogric acid may be prepared rather easily; but chaulmoogryl derivatives of amino benzoic acids are much more difficult to prepare, because the reaction takes place very slowly.

ACKNOWLEDGMENT

Thanks are due Miss Irene Santos, of the department of chemistry, University of the Philippines, for assistance in making the analyses.

HYMENOPTERA FROM LUCBAN, PHILIPPINE ISLANDS

By T. D. A. COCKERELL

Of the University of Colorado, Boulder

The following bees were collected by Mr. R. C. McGregor at Lucban, Tayabas Province, Luzon, in May, 1926:

COELIOXYS PHILIPPENSIS Bingham.

One female.

COELIOXYS GENALIS Cockerell.

One female.

MEGACHILE BAKERI Cockerell.

Three females. These vary in size, from about 12.5 to 15 millimeters long. The smaller one would therefore run in my key to 9 (the scape being pale orange, black on last two segments), and run out because the abdomen is not banded.

MEGACHILE RUFOFULVA Cockerell.

One female. Previously known from Mindanao.

ANTHOPHORA KOROTONENSIS Cockerell.

Four females and one male.

CROCISA CRUCIFERA Cockerell.

Five females and two males. Doubtless parasitic on the nests of the *Anthophora.*

APIS BINGHAMI Cockerell.

One worker.

NOMIA LONGITARSIS Cockerell.

One female.

NOMIA RECESSA Cockerell.

One female. Previously known by the unique type. The new specimen has a narrow, light yellow tegumentary band at apex of second abdominal segment.

HALICTUS BANAHAONIS MACERULA Cockerell.

Eight females. "Many small holes in damp clay bank, side of road, Lucban-Mauban. One hole was 8 to 9 centimeters deep." The size is uniform. This is the first information about the nesting habits.

XYLOCOPA FULIGINATA Pérez.

One female, and three males.

MESOTRICHIA BOMBIFORMIS Smith.

Twenty-three females and a male; also a pair sent together, the male being *M. major* Maidl. Miss Norma Le Veque, who mounted the bees, called my attention to this, and we both wondered why we had not thought of associating these insects before. It always seemed strange that the rather common *M. major* had no mate.

MESOTRICHIA BOMBIFORMIS Smith, variety a.

One female. A puzzling, small, and much worn female was at first taken for a distinct species, but it appears to be only a variation of *M. bombiformis*. The wings appear rather dilute fuliginous, semitransparent, and are much worn, but if complete would not exceed 20 millimeters in length. The labrum beneath is fringed with short coppery red hair, whereas in typical *bombiformis* it is black. The flagellum is chestnut red beneath except at base, and the tuft of hair at extreme apex of abdomen is red. The first three abdominal segments have the apical margin narrowly red. I find that true *bombiformis* varies in respect to the abdominal characters mentioned.

In view of the size variation of *M. bombiformis*, it will be well to give a new table to separate the rather similar black *Mesotrichia* females of the Philippine Islands. All have the second cubital cell complete, whereby they are distinguishable from *M. unicolor* (Smith).

With a band of grayish white hair behind eyes; wings very dark, apical part green ..... **M. amauroptera Pérez.**

With only black regular hair behind eyes..... 1.

1. Cheeks, behind eyes, closely punctured; wings with golden green luster ..... **M. bakeriana Cockerell.**

Cheeks, behind eyes, shining and very sparsely punctured. **M. bombiformis (Smith).**

MESOTRICHIA PHILIPPINENSIS CHLORINA Cockerell.

One female.

MESOTRICHIA LUCBANENSIS sp. nov.

Female (*type*).—Length, about 20 to 22 millimeters, anterior wing, 20 to 21; almost exactly like *M. canaria* Cockerell and Le Veque, from Samar, but yellow hair on mesopleura more reduced, forming a triangular patch on upper part; yellow hair on first abdominal segment at first sight appearing absent but close inspection shows some yellow hairs; wings with strong blue-green and purple tints. Grayish white hair is mixed with black on the face.

Male.—What I take to be the male of *M. lucbanensis* is about 24 millimeters long; anterior wing, nearly 21; insect covered with yellowish green hair, strongly mixed with black on abdomen, especially toward the apex; anterior and middle tarsi with very long red hair, hind tarsi with some red, but black behind except at apex. Clypeus black, with median line and lower border (broadening at sides) yellow; mandibles with yellow basal spot; scape and third antennal joint yellow in front (beneath), flagellum beyond base clear ferruginous beneath. Intermediate in size between *M. euchlora* Pérez and *M. major* Maidl (*bombiformis* Smith). The abdomen appears darker than in either, the hind margins of segments 3 to 5 appearing as black bands. The wings are distinctly darker and more rosy than in *M. major*. There is a broad median band of black hair on the hind tibiæ posteriorly; in *M. major* and *M. euchlora* this stripe is bright red. The mesosternum is black haired.

LUZON, Tayabas Province, Lucban, May, 1926 (*McGregor*); twelve females and one male.

It is a matter of opinion whether this is to be considered a distinct species or a subspecies of *M. canaria;* but, as it occurs on a different island, and presumably does not intergrade, I treat it as a species.

Mesotrichia bluethgeni (*Xylocopa bluethgeni* Dusmet), from Puerto Bango (Port Banga?), Mindanao, is a closely analogous form, but has lemon yellow hair mixed with the black on face (*M. lucbanensis* has sparse yellow hairs on sides of occiput), and the first abdominal segment is yellow haired as in *M. ghilianii* (Gribodo). The latter has the hair of head all black or with a very few scattered yellow hairs on cheeks, and is a distinctly larger insect. The wings of *M. bluethgeni* are colored practically as in *M. lucbanensis*.

SCOLIIDÆ [1]

CAMPSOMERIS AUREICOLLIS MCGREGORI subsp. nov.

Female.—Tufts of long and conspicuous white hair between eyes and antennæ; hair of cheeks and underside of thorax anteriorly white; hair of occiput, prothorax, and a little on anterior margin of mesothorax bright orange ferruginous; anterior femora with some pale red hair; posterior face of mesothorax shining and impunctate, but its dorsal surface punctured sublaterally; fringe of second abdominal segment mainly black, but some hairs have the apical half pale, that of third also has a very little pale. Mandibles red at tip.

The type is from Lucban, but McGregor obtained the same thing in some numbers at Culasi, Panay, in June. I had considered it a form of *C. thoracica* (Fabricius), following Bingham, but it is probably a distinct species, and differs from the typical *C. aureicollis* Lepeletier, from Java, by the white hair of head (except occiput). Lepeletier's description also indicates a much more hairy abdomen. Smith reported *Scolia aureicollis* from the Philippine Islands, doubtless the same insect.

The following species, not found at Lucban, was obtained by McGregor at Culasi, Panay, in June:

SCOLIA (SCOLIA) PANAYENSIS sp. nov.

Male.—Length about 22 millimeters; anterior wing, 20 (a smaller specimen has anterior wing 17.2 millimeters); closely related to *S. incerta* Rohwer, differing as follows: Antennæ about 13.5 millimeters (about 12 in the smaller specimen); median sulcus on front going beyond transverse one, forming a cross; vertex with distinct scattered punctures; spurs ferruginous; legs clear ferruginous, with red hair, the anterior tarsi yellowish, and their tibiæ stained with yellow; abdomen above strongly suffused with purple and lilac, in the larger specimen purple-blue and on first three segments with much green, in the smaller the first three segments rosy purple to lilac, not green; clypeus entirely honey color; mandibles honey color at base; lobes and upper margin of pronotum reddish honey color, with red hair; hair of head and thorax very bright ferruginous red; sides of thorax with pale golden pile; wings hyaline, strongly stained with orange ferruginous, the apex of anterior wings broadly fuliginous (this more dilute in smaller specimens).

[1] The fine large species *Scolia scutellaris* Gribodo was taken at Manila by Mr. McGregor.

In many respects very much like *Campsomeris ceylonica* W. F. Kirby,[2] but easily distinguished by having only one recurrent nervure and the abdomen without yellow.

PANAY, Antique Province, Culasi, 1918 (*McGregor*).

CHRYSIDIDÆ

HEDYCHNIDIUM TAYABICUM sp. nov.

This is so like *H. wroughtoni* du Buysson from the Central Provinces of India, that I have hesitated to separate it; but, in view of the distant locality, it is probably distinct. It is smaller (about 6 millimeters long; *wroughtoni,* 7.5) ; bright green, with very fine purple patches on top of head, forming a transverse band across prothorax, on middle of mesothorax and scutellum, sublaterally behind scutellum, and extensively covering the abdominal tergites; the very scanty pubescence is white (reddish brown in *wroughtoni*) ; flagellum black (brownish in *wroughtoni*) ; tarsi black (reddish brown in *wroughtoni*) ; punctures of abdomen rather dense, excessively so on first segment, rather sparse along middle line of second. The third segment is shallowly but very distinctly channelled before the apex.

LUZON, Tayabas Province, Lucban, May, 1926 (*McGregor*).

Easily known from *Hedychrum stantoni* Ashmead by the strongly dusky wings, legs green except the tarsi, and broadly rounded third abdominal segment not at all angulate at sides. The claws have a single divergent tooth. The front, above the antennæ, is minutely, very evenly transversely striate, except at sides, where it is punctured. The scape is bluish green. The metathorax has a dentiform process on each side posteriorly.

MUTILLIDÆ

TROGASPIDIA ITAMBUSA sp. nov.

Male.—Length 21.5 millimeters, anterior wing, 18; entirely black, head and thorax with long and coarse but not dense hair; wings entirely dark fuliginous, with steel blue luster; head with mostly black hair, but long and white on cheeks posteriorly, dense and shining white at sides of face next to eyes; some orange hairs on mandibles and in region of mouth; mandibles bidentate, outer margin with a small dentiform projection on basal half; clypeus concave, polished and shining, with a median keel, its

[2] Turner calls this *Scolia* (*Dielis*) *lindenii ceylonica* (Kirby), based on Kirby's male, the female associated with it by Kirby being a variety of *S. iris.*

lower margin truncate, the truncation with salient corners and the sides sloping, slightly concave, to the malar region; front coarsely and confluently rugose; vertex with very large and dense punctures; ocelli moderate, close together; antennæ long, third joint a little shorter than fourth, apical joint flattened; thorax very coarsely confluently punctured; mesothorax with a central raised line and very strong parapsidal grooves; scutellum conically elevated, the anterior side of the elevation with a median shining sulcus; dorsal face of metathorax coarsely reticulated, in the middle with a smooth band bounded by a pair of longitudinal keels, which abruptly curve outward at the base, there inclosing a larger area; sides of metathorax angulate; thorax above with coarse black hair, abundant on scutellum; beneath with white hair, and a band of short white hair at extreme base of metathorax; tegulæ large, shining, with a few punctures anteriorly; three cubital cells, second and third each receiving a recurrent nervure; third cubital pentagonal, or hexagonal if we count the short face between lower apical corner and end of second recurrent, which is bent upward from the line of lower side at insertion of recurrent; marginal cell more than twice as long as wide; basal nervure going a short distance basad of nervulus; legs with erect silvery hair, but black on outer side of hind tibiæ, and partly ferruginous on tarsi; spurs yellowish white, on middle and hind legs one longer than the other; abdomen subpetiolate, shining; first segment with a strong dentiform obtuse process beneath, second simple beneath; first tergite very coarsely punctured and with a median groove, its hind margin briefly and densely white ciliate; remaining segments without bands or spots, hind margin shining reddish in certain lights; second segment coarsely punctured subbasally, but very finely and sparsely beyond, the remaining segments also finely and sparsely punctured; apex obtusely truncate, with no salient spines; abdomen with the rather scanty hair black. The scape is bicarinate beneath as in *T. bicolor*.

LUZON, Tayabas Province, Lucban, May, 1926 (*McGregor*); one specimen.

A very distinct species, by its large size, black color, elevated scutellum, etc. I place it in Ashmead's genus *Trogaspidia*, where it falls according to his key. It is also evidently congeneric with *T. bicolor* and *T. minor* of Ashmead, described from the Philippine Islands, although the type of *Trogaspidia* (*medon* Smith) is African. *Mutilla luzonica* Rad. is evidently very close indeed to *T. minor* Ashmead. André, in 1904, ob-

jected to the separation of *Trogaspidia,* because he said the elevated scutellum occurred in many males of diverse regions and relationships. Bradley and Bequaert (1923) treat *Trogaspidia* as a subgenus of *Smicromyrme* Thomson, enumerating sixteen African species before them. The male *Smicromyrme* differs from true *Mutilla* by its bidentate (instead of tridentate) mandibles, and the nonspinose hind tibiæ. *Trogaspidia* is *Smicromyrme* with conically elevated scutellum. On this definition, the insect now described is certainly a *Trogaspidia.* In André's key it actually runs to *Dolichomutilla* Ashmead, except as to the second ventral segment, but the strong parapsidal grooves exclude it from that in Ashmead's key. *Dolichomutilla,* peculiar for the long head, is exclusively African.

If we follow André in sinking *Trogaspidia* in *Mutilla,* then *T. bicolor* Ashmead requires a new name, there being already a *Mutilla bicolor.* Comparing *Trogaspidia itambusa* with *Mutilla europaea* Linnæus, the type of *Mutilla,* it is seen that both marginal and second cubital cells are much longer in the new species; the third cubital receives the recurrent near the end, instead of about the middle as in *M. europaea.*

Mutilla analis Lepeletier (said to equal *M. fuscipennis* Fabricius) and *M. dimidiata* Lepeletier, both recorded from the Philippines, have a tuberculate scutellum in the male, and presumably fall in *Trogaspidia. Mutilla luzonica,* already referred to, is close to *M. analis.* According to this view, the Philippine *Trogaspidia* males fall in three groups:

1. Abdomen all black; very large species..... **itambusa sp. nov.**
2. Abdomen partly red; species 17 to 20 millimeters long.. **bicolor Ashmead.**
   dimidiata Lepeletier.

   They are certainly very much alike, and perhaps the supposed Philippine *dimidiata* (that species being typically Indian) was really *bicolor.*
3. Abdomen partly red; smallest species, 12 to 13 millimeters long.
   luzonica Rad.
   analis Lepeletier.
   minor Ashmead.

   Mutilla analis is typically Indian, and perhaps the Philippine record is based on one of the others.

NEW PHILIPPINE MUSCOIDEA

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This paper presents some of the results of a study of material sent me by Prof. Charles F. Baker.

Genus UROEUANTHA novum

Genotype, *Uroeuantha longipes* sp. nov.

Differs from *Minthomyia* as follows: Frontal profile at least one and one-third times facial profile; clypeus nearly flush, depressed next facialia, subequal, length of clypeus nearly 3 times width of clypeus; palpi short, stout-cylindric, bowed, not thickened at tip in male; base of antennæ rather below eye middle; male vertex hardly over one-eleventh head width, front equilateral on posterior two-thirds and then widening to one-fifth head width at base of antennæ; 2 hairlike verticals in male, inner verticals convergent; no reclinate frontoörbitals in male; male frontalia linelike, visible only on anterior half, parafrontalia approximated over frontalia and meeting on posterior half; ocellars 3 pairs proclinate, curved, not divaricate; parafacialia narrow, nearly equilateral, not quite as wide as facialia reversed; cheeks hardly over one-tenth eye length; 1 sternopleural, 3 postsutural dorsocentrals, 3 preacrostichals but only the middle one strong, no postacrostichals, 2 lateral scutellars, apical scutellars decussate and shorter than basal lateral scutellars, no discal scutellars; 1 bristle at base of fifth radial or third vein; fifth radial or apical cell widely open well before wing tip; third medial or hind crossvein nearer cubitulus and nearly its length therefrom, long; front legs and hind legs extraordinarily long in male, very slender, tarsi extremely elongate (middle legs missing) ; front metatarsi equaling front tibiæ, hind metatarsi equal next joint of tarsi; in male fourth apparent or fifth actual abdominal segment caudate, tail as long as rest of abdominal segment; scattered long discal and terminal bristles below and on sides and tip of fourth apparent or fifth actual abdominal

segment, but only short bristles above like hairs of rest of abdomen.

UROEUANTHA LONGIPES sp. nov.

Length of body, 12 millimeters; length of wing, 11. Kolambugan, Mindanao; one male, No. 23236.

Head silvery; frontalia brown; palpi very pale testaceous; pleura silvery; mesoscutum silvery with a faint yellowish tinge; 4 black thoracic vittæ, inner pair linelike before transverse suture but lost behind in wide median black area that does not reach hind margin of postscutum and narrows some posteriorly; scutellum blackish brown, silvery on tip; abdomen yellow, extreme base above, median vitta above and below, hind edge of second apparent or third actual abdominal segment and all of last 2 abdominal segments except front fourth of third apparent or fourth actual abdominal segment brownish black, basal fourth of last 2 abdominal segments silvery; legs dark brown, coxæ silvery; wings faintly yellowish smoky, costa from stigma to wing tip slightly more marked; squamæ translucent, with straw colored edge.

Genus URODEXIOMIMA novum

Genotype, *Urodexiomima uramyoides* sp. nov.

Differs from *Pseudodexia* as follows: Frontal profile rather flattened, but little arcuate, 1.5 times facial profile; clypeus nearly flush, narrow, length of clypeus over 2 times width of clypeus; facialia bare, flattened-cordlike; vibrissal axis some less than antennal axis, latter quite three-fourths head height; palpi long, slender, subcylindric, scarcely thickened at tip in male, a little thicker on distal third; base of antennæ rather below eye middle; in male third antennal joint 3 times second antennal joint, narrow, rounded at tip; arista short, scarcely longer than third antennal joint, thinly long-plumose to tip; in male vertex one-fifth head width, front equilateral on hind half and then widening to one-third head width at base of antennæ; verticals 1 in male; parafacialia bare, strongly narrowed below, as wide above as width of clypeus; cheeks probably one-third eye length (shrunken); 2 postintraalars and postacrostichals, 2 long lateral scutellars, long decussate apical scutellars, 1 moderately strong discal scutellar; first radial or first vein terminating very far beyond sixth radial or small crossvein, with 1 bristle at tip on one side; fifth radial or apical cell narrowly open moderately before wing tip; third medial or hind crossvein sinuate, three-

fourths its length from cubitulus; squamæ rather large, strongly widened behind, the subangular inner corners produced inward; 1 median marginal on first apparent or second actual abdominal segment.

URODEXIOMIMA URAMYOIDES sp. nov.

Length of body, 8.5 millimeters; length of wing, 7.5. Los Baños, Luzon; 1 male.

Head tawny silvery; frontalia and antennæ reddish fulvous, third antennal joint largely brown; palpi fulvous; pleura and mesoscutum grayish silvery; 4 thoracic vittæ, outer pair very broad and interrupted at transverse suture, inner pair narrow before transverse suture, all four subconfluent behind transverse suture in a large rich brown subrectangular marking showing some golden pollen; scutellum brown on base, pollinose on tip and hind margin; abdomen fulvous yellow; median vitta, first actual abdominal segment, posterior third of first apparent or second actual abdominal segment, posterior two-fifths of second apparent or third actual abdominal segment, posterior half of third apparent or fourth actual abdominal segment and angular tip of fourth apparent or fifth actual abdominal segment brown; bases intermediate segments narrowly silvery, nearly basal three-fourths of fourth apparent or fifth actual abdominal segment silvery; coxæ and femora fulvous, tibiæ little darker, tarsi blackish; wings nearly clear; squamæ glassy whitish.

Genus SISYROPODODEXIA novum

Genotype, *Sisyropododexia luteicornis* sp. nov.

Differs from *Spathidexia* as follows: Palpi length of haustellum, bowed, wide throughout; in male third antennal joint 3 times second antennal joint, narrow, equilateral, rounded at tip; arista longer than antennæ, short-plumose halfway; eyes very large and long, not oblique, reaching far below oral margin level; in male vertex one-fifth head width, front only faintly widening to less than one-third head width at base of antennæ; frontals stopping at base of antennæ, 4 or 5 in number; verticals 2 in male; proclinate frontoörbitals 3 in male, set in middle of width and on posterior half of length of parafrontalia; reclinate frontoörbitals 1 in male, set inside and in advance of hind proclinate frontoörbitals; cheeks hardly over one-fifteenth eye length or less; 2 postintraalars and preacrostichals; no costal spine; fifth radial or third vein bristled one-third to one-half way to sixth

radial or small crossvein; fifth radial or apical cell open a little before wing tip; third medial or hind crossvein sinuate, not its length from cubitulus; all metatarsi exceeding following joints.

SISYROPODODEXIA LUTEICORNIS sp. nov.

Length of body, 10 to 11 millimeters; length of wing, 9. Surigao and Dapitan, Mindanao, and Sibuyan; 3 males.

Yellowish ground color; head silvery white; vertex and parafrontalia on inner edge and above golden; frontalia dark brown; antennæ bright yellow; palpi pale straw color; pleura silvery; mesoscutum golden; 4 blackish thoracic vittæ, inner pair narrow; scutellum pale yellowish or fulvous, light golden pollinose; abdomen fulvous yellow, basal depression, median vitta, and hind borders of last 2 abdominal segments blackish, narrow base of first 2 abdominal segments and basal half of fourth apparent or fifth actual abdominal segment silvery; legs yellow, tarsi and hind tibiæ black; wings yellowish on costa and veins; squamæ yellowish.

Genus PHILIPPOFORMOSIA novum

Genotype, *Philippoformosia splendida* sp. nov.

Differs from *Rutilodexia* as follows: Facial carina not canaliculate on median line; arista micropubescent; parafacialia hairy; cheeks fully three-fourths eye length; fifth radial or apical cell widely open considerably before wing tip; hind tibiæ short-ciliate; fourth apparent or fifth actual abdominal segment with marginal row hairlike and longer than marginal row of third apparent or fourth actual abdominal segment.

PHILIPPOFORMOSIA SPLENDIDA sp. nov.

Length of body, 13 millimeters; length of wing, 14. Imugan, Nueva Vizcaya Province, Luzon; 1 female.

Head metallic bluish green; frontalia dark brown; antennæ, clypeus, epistoma, facialia, palpi, and cheek grooves brownish testaceous; pleura blackish green; mesoscutum bright green, with golden reflections; 4 violet cupreous thoracic vittæ, inner pair black and narrow before transverse suture, all violaceous and subconfluent behind transverse suture; scutellum cupreous violet, narrow margin blackish green; abdomen golden green with some bright cupreous reflections, first apparent or second actual abdominal segment, median line, and posterior half of intermediate segments dark chocolate brown, venter showing green on front portions of first apparent or second actual abdominal segment; legs blackish; wings lightly tinged with yel-

lowish smoky, darker on veins, blackish on basal cells and first subcostal or humeral crossvein; squamæ pale smoky brownish.

Genus EPSEUDOCYPTERA novum

Genotype, *Epseudocyptera epalpata* sp. nov.

Differs from Brauer and Bergenstamm's description of *Pseudocyptera* as follows: Palpi absent; in female vertex one-fourth head width, front widening to fully two-fifths head width at base of antennæ; wings nearly clear; abdomen very long-oval, the wider end forward. There are 2 sternopleurals, being the anterior, the hind absent; 3 postsutural dorsocentrals, 2 postintraalars, 3 very short preacrostichals; 3 postacrostichals, the 2 front ones short; 2 lateral scutellars, strong decussate apical scutellars, 1 very small hairlike discal scutellar; cheeks nearly one-third eye length; epistoma cut off just above vibrissal level, full width, strongly and suddenly warped; frontals 5, stopping at front edge of base of antennæ.

EPSEUDOCYPTERA EPALPATA sp. nov.

Length of body, 10 millimeters; length of wing, 7.5. Davao, Mindanao; 1 female.

Head silvery, frontalia brown; first antennal joint and basal half of second antennal joint brown, rest of second antennal joint subrufous, third antennal joint subfulvous; pleura, mesoscutum, and scutellum silvery; 4 black thoracic vittæ, inner pair narrower; abdomen black, intermediate segments widely silvery on base; legs black, tibiæ subfulvous on distal half; wings faintly yellowish on costa, subfulvous on base, faintly blackish on tip; squamæ watery whitish.

Genus PALPOCYPTERA novum

Genotype, *Palpocyptera pulchra* sp. nov.

Differs from *Ocypteropsis* as follows: Frontal profile not over two-thirds facial profile, flat, but little sloped; clypeus flush, arched on median line, length of clypeus 1.5 times width of clypeus; epistoma cut short, full width, well warped; vibrissal axis equals antennal axis, latter nearly three-fifths head height; proboscis (retracted) apparently short but slender and corneous, labella rather small; female vertex three-thirteenths head width, front widening gradually, face in middle little over one-half head width; verticals 1, long and strong in female; frontalia gently narrowed posteriorly, little over 1.5 times width of parafrontal in middle in female; parafacialia bare, narrow, long,

nearly equilateral, little wider than widest part of facialia; 3 preacrostichals; 4 postacrostichals, the front 2 weaker; 1 discal scutellar, shorter than the decussate apical scutellars; fifth radial or apical cell petiolate well before wing tip, stalk shorter than sixth radial or small crossvein; third medial or hind crossvein strongly sinuate, two-thirds its length from cubitulus; marginal row on third apparent or fourth actual abdominal segment.

PALPOCYPTERA PULCHRA sp. nov.

Length of body, 16.5 millimeters; length of wing, 13. Surigao, Mindanao; 1 female.

Shining black; head light golden pollinose, changing in oblique view to rust brown; frontalia velvety dark brown; parafrontalia shining dark brown on over hind half; palpi dark brown, tips paler; occiput gray, beard pale brassy; pleura, mesoscutum, and scutellum thinly silvery; 4 black thoracic vittæ, inner pair linelike; basal third of second apparent or third actual abdominal segment and nearly basal half of third apparent or fourth actual abdominal segment deep golden pollinose; coxæ and femora pale golden pollinose on outside; tibiæ rufous except base; wings well suffused with yellow, veins darker; squamæ nearly concolorous, more or less glassy.

Genus OPSOCYPTERA novum

Genotype, *Opsocyptera optima* sp. nov.

Differs from *Ocypterula* as follows: Clypeus flush, narrow, long, equilateral, length of clypeus fully 2.5 times width of clypeus; epistoma full width, nearly half as long as wide, strongly warped; vibrissal axis exceeding antennal axis, latter nearly head height; eyes bare, oblique, long, reaching rather below oral margin level and well below vibrissal level; female vertex scarcely one-third head width, front widening gently to over one-third head width at base of antennæ; frontals 5 or 6, small, stopping even with frontalia and closely approximated to same; 2 proclinate frontoörbitals in female, hind one very short and weak like frontals; 1 weak reclinate frontoörbital in female; ocellars 1, weak, proclinate, and 1 weak divaricate behind ocelli, also occipitocentrals behind latter; parafacialia bare, equilateral, width of parafacial a little less than width of clypeus; cheeks one-fourth eye length; 2 sternopleurals; 2 lateral scutellars, both long and equal; strong decussate apical scutellars, shorter than lateral scutellars; first medial or apical crossvein strongly sinuate; short stump of vein at cubitulus;

female abdomen long and narrow, equilateral, over 2 times thorax in length, showing 5 abdominal segments from above but first very short; fourth apparent or fifth actual abdominal segment with marginal row of 6 but the median marginal pair set so far forward as to appear discal.

OPSOCYPTERA OPTIMA sp. nov.

Length of head, 8 to 9 millimeters; length of wing, 6 to 6.75. Dapitan and Kolambugan, Mindanao; 2 females, No. 23258.

Head silvery, parafrontalia faintly brassy; frontalia dark brown, antennæ blackish; pleura silvery between leg grooves; mesoscutum thinly silvery, with very faint brassy tinge; 4 thoracic vittæ, dark, outer pair heavy, inner pair very delicate linelike; scutellum thinly silvery; abdomen rufous, extreme base, median vitta on base, hypopygium, fourth apparent or fifth actual abdominal segment and irregular posterior half of third apparent or fourth actual abdominal segment black; second apparent or third actual abdominal segment narrowly silvery on base, third apparent or fourth actual abdominal segment silvery more or less over basal two-thirds; legs black; wings yellow on broad costobasal portion, blackish on rest of vein region but with light areas in fifth radial or apical cell and discal cell, wide irregular inner border nearly clear; squamæ whitish, with narrow tawny edge.

Genus ZAMBESOIDES novum

Genotype, *Zambesoides samarensis* sp. nov.

Differs from *Zambesa* as follows: Head wider than high, vertex well depressed below top level of eyes; vibrissal axis equal to antennal axis, latter three-fourths head height; second antennal joint elongate, third antennal joint in female hardly 3 times second antennal joint; eyes bare, oblique, reaching nearly to vibrissal level; female vertex hardly over one-seventh head width, front widening very gradually to scarcely one-fourth head width at base of antennæ, face in middle little over one-third head width; verticals 1 in female, decussate; 1 strong proclinate frontoörbital in female; frontalia in female gently narrowed posteriorly, equal to width of parafrontal in middle; no preacrostichals, 1 weak postacrostichal; apical scutellars decussate, equal to basal lateral scutellars; sixth radial or small crossvein normal, first radial or apical crossvein terminating opposite same; fifth radial or apical cell open 2 times its mouth width before wing tip, its tip elongate and narrow; cubitulus

rounded obtuse angled, one third-width of wing from hind margin of wing; first medial or apical crossvein arcuate inward; no median discals on any abdominal segments.

ZAMBESOIDES SAMARENSIS sp. nov.

Length of body, 11 millimeters; length of wing, 9. Borongan, Samar; 1 female.

Head silvery, parafrontalia more leaden silvery; frontalia dark brown; antennæ black, third antennal joint dark brown shading to subrufous on inner proximal half; palpi blackish; pleura silvery, mesoscutum more leaden silvery; 4 blackish thoracic vittæ, inner pair delicately linelike; scutellum black, faintly silvery; abdomen black, bases intermediate segments and all of fourth apparent or fifth actual abdominal segment silvery, ventral triangles silvery on first apparent or second actual abdominal segment and second apparent or third actual abdominal segment, whole venter of third apparent or fourth actual abdominal segment and short basal or first actual abdominal segment silvery; legs blackish, proximal three-fourths of femora largely pale fulvous; wings faintly smoky, slightly darker on costa from stigma to wing tip; squamæ glassy, narrow edges opaque straw color.

Genus ANDROCYPTERA novum

Genotype, *Androcyptera anorbitalis* sp. nov.

Differs from *Ichneumonops* as follows: Clypeus flush, length of clypeus 2 times width of clypeus; vibrissæ long, decussate, removed from oral margin at least laterally; third antennal joint 1.5 times second antennal joint, narrow, rounded at tip; vertex in male and female over one-fourth head width, front widening gently in female to one-third and in male to over one-third head width at base of antennæ; no proclinate frontoörbitals nor reclinate frontoörbitals in male or female; cheeks scarcely one-fourth eye length; 1 lateral scutellar; apical scutellars strong, decussate, not as long as lateral scutellar; fifth radial or apical cell long-petiolate far before wing tip, stalk over 2 times sixth radial or small crossvein and strongly bent up; cubitulus rounded right angled to faintly obtuse angled, one-third width of wing from hind margin of wing; first medial or apical crossvein bent in at tip to form a V with stalk of fifth radial or apical cell, in middle faintly bent in; no wrinkle at cubitulus; abdomen bottlelike, petiolate, 2 times length of thorax in male, not 2 times

of thorax in female; first apparent or second actual abdominal segment strongly widened posteriorly; 1 median marginal on first apparent or second actual abdominal segment and second apparent or third actual abdominal segment, marginal row of 6 to 8 on third apparent or fourth actual abdominal segment and fourth apparent or fifth actual abdominal segment.

ANDROCYPTERA ANORBITALIS sp. nov. —

Length of body, 6 to 7 millimeters; length of wing, 4.5 to 6. Baguio, Benguet; Luzon, 2 females, No. 5037. Tangkulan, Bukidnon, Mindanao; 2 males, No. 23240.

Head silvery, parafrontalia faintly golden in male; frontalia and antennæ brown, base of third antennal joint lighter in female; pleura and mesoscutum silvery, 2 very broad subconfluent black thoracic vittæ; scutellum and abdomen brownish black, bases of last 3 abdominal segments silvery; legs blackish, femora and coxæ silvery; wings lightly smoky in male, more dilute in female; squamæ nearly white, faintly yellowish in female at times.

Genus ALOPHOROPHASIA novum

Genotype, *Alophorophasia alata* sp. nov.

Differs from *Xanthosyntomogaster* as follows: Epistoma long, wide, widened some below, not one-half length of clypeus nor as long as upper width, well sprung, width of epistoma fully 2 times width of facialia plus width of parafacial; vibrissæ strong, well differentiated; palpi stout-cylindric, length of antennæ, scarcely thickened at tip in male; second antennal joint elongate; third antennal joint in male nearly 2 times second antennal joint, rather narrow, rounded at tip; eyes bare, very large, not oblique, excavated behind on lower half, reaching below oral margin level but not completely hiding cheeks; frontals 11 to 12, close to frontalia, stopping at base of antennæ; parafacialia narrow, equilateral, one-third width of clypeus and same width as facialia; cheeks one-twelfth eye length in male; 3 sternopleurals, no preacrostichals, 1 lateral scutellar; cubitulus strongly rounded obtuse angled, one-seventh width of wing from hind margin of wing; third medial or hind crossvein sinuate, not its length from cubitulus; no median discals on any abdominal segments, macrochætæ extremely short and barely differentiated, median marginals, middle legs and lateral discals on first apparent or second actual abdominal segment.

ALOPHOROPHASIA ALATA sp. nov.

Length of body, 10 millimeters; length of wing, 8.75. Mount Banahao, Luzon; 1 male, No. 5026.

Head golden; frontalia, antennæ and palpi blackish; occiput and cheeks silvery, head whitish; pleura, 2 spots on front edge of prescutum, humeri, hind margin of prescutum and hind and lateral margins of postscutum silvery; rest of mesoscutum black, thoracic vittæ not apparent; scutellum brown to blackish; abdomen fulvous yellow, shading dusky above and below on median line and hind half; legs deep brown, trochanters and coxæ subfulvous; wings lightly yellowish smoky; squamæ translucent, faintly smoky, squamulæ more opaque and whitish.

Genus OCHROPHASIA novum

Genotype, *Ochrophasia atripennis* sp. nov.

Differs from *Clytiomya* as follows: Epistoma one-half length of clypeus, gently warped, width of epistoma one-half width of facialia plus width of parafacial; facialia very wide, flattened, bare, slightly oblique to clypeal plane, as wide below as parafacialia, width of facialia two-thirds width of clypeus; no differentiated vibrissæ, only short bristles of even length; palpi equal third antennal joint, stout-clavate, bowed; female vertex not one-fifth head width, front widening very rapidly to two-fifths head width at base of antennæ; frontalia female short, broad, nearly equilateral, fully equaling width of parafrontal in middle, anterior points spread, length of frontalia on median line from lunula to ocellar triangle little over 2 times width; parafacialia as wide above as clypeus; apical scutellars parallel, short; fifth radial or apical cell open nearly in wing tip; cubitulus rounded widely obtuse angled, scarcely one-fourth width of wing from hind margin of wing; hypopygium in female small, ventrocaudal aspect, telescoped, normal, egg-depositing.

OCHROPHASIA ATRIPENNIS sp. nov.

Length of body, 11 millimeters; length of wing, 9.5. Surigao, Mindanao; 1 female.

Head golden, more brightly so on parafrontalia; frontalia and antennæ brown; palpi pale fulvous; upper half of occiput blackish; beard brassy whitish; pleura golden; mesoscutum blackish, margins fulvo-rufous and golden pollinose; scutellum and abdomen orange-ocherous, venter paler yellow; legs orange yellow, tibiæ and tarsi blackish; wings smoky black throughout, scarcely lighter on inner edge, squamæ golden yellow.

Genus OXYDEXIOPS novum

Genotype, *Oxydexiops uramyoides* sp. nov.

Differs from *Meigenia* as follows: Frontal profile long, flattened in female and faintly arcuate in male, strongly sloped, scarcely longer than facial profile to end of epistoma; clypeus well depressed, narrowing gently upward, length of clypeus 2.5 times width of clypeus; epistoma long, full width, in clypeal plane in male and gently warped in female, fully one-half as long as wide; vibrissæ strong, decussate, far above oral margin level; proboscis very short and stout, haustellum equal to length of labella and not one-fourth head height, labella very large; palpi stout, bowed, length of haustellum, widened and flattened, especially in female; base of antennæ on eye middle; arista longer than whole antennæ, thickened one-sixth to one-seventh way, micropubescent on a little more than thickened part; vertex, male and female, one-eleventh head width, front equilateral on over posterior half in female and on nearly posterior half in male, then widening to one-fifth head width at base of antennæ in male and somewhat less in female (but head shrunken in female); 2 strong proclinate frontoörbitals, male and female, close to frontals; frontalia one-half width of parafrontal in middle in male, over one-half in female; cheeks one-sixth eye length in male, one-seventh in female; 2 sternopleurals, no discal scutellars; fifth radial or apical cell open well before wing tip; cubitulus rounded right angled to slightly obtuse angled, one-sixth width of wing from hind margin of wing; first medial or apical crossvein well arcuate inward; squamæ rather long, well widened behind, subangular on inner corner, especially in male; legs long, in male middle legs longer than others; hind tibiæ short-ciliate or cilia on basal half or so, male and female, with a slightly stouter bristle near middle; in female metatarsi equal to following joints, middle metatarsi in female longer than following joints; in male metatarsi not equal to following joints, middle metatarsi and tarsi in male very long.

OXYDEXIOPS URAMYOIDES sp. nov.

Length of body, 11 to 16 millimeters; length of wing, 9 to 10.5. Butuan, Mindanao; 2 males. Davao, Mindanao, and Mount Banahao, Luzon; 2 females, No. 23233.

Head silvery, parafrontalia in male brassy on posterior half; frontalia and antennæ blackish brown, second antennal joint and base of third antennal joint more or less rufous; palpi fulvous; pleura silvery; mesoscutum silvery, faintly brassy; 4

blackish brown thoracic vittæ, inner pair narrower, outer pair semicolonlike and confluent with inner pair behind transverse suture in rectangular brown marking pronged behind on each side; scutellum dark brown on base, silvery on apical half; abdomen pale rufo-fulvous, female with first apparent or second actual abdominal segment, hind borders of last 3 abdominal segments and broken median vitta dark brown; male with depression of first apparent or second actual abdominal segment, narrow median vitta, broad hind borders of intermediate segments and all of fourth apparent or fifth actual abdominal segment except extreme base brown; light parts of abdomen thinly silvery pollinose and fourth apparent or fifth actual abdominal segment in male same; legs brown, femora fulvous except tips of middle femora and hind femora; wings in female clear, in male faintly yellowish smoky along veins; squamæ glassy whitish, faintly tawny yellowish in male.

NEW OR LITTLE-KNOWN TIPULIDÆ FROM THE PHILIPPINES (DIPTERA), PART IV [1]

By CHARLES P. ALEXANDER
Of Amherst, Massachusetts

TWO PLATES

Through the great kindness of Mr. Richard C. McGregor and Dr. C. F. Baker, I have had for study a considerable amount of additional material in the Tipulidæ, some of which is discussed in the present report. Through the kindness of the collectors, I have been permitted to retain the types of the novelties discussed here. Our knowledge of the crane flies of the Philippines, although still very incomplete, has received its greatest impetus through the kind interest of Mr. McGregor and Professor Baker.

A recent, very important paper on the Tipulidæ collected by the late G. Boettcher has added greatly to our knowledge of the subject. F. W. Edwards [2] has listed all of the papers hitherto published that concern the Tipulidæ of the Islands and has listed the species of the family hitherto recorded from the Philippines (about 56), to which are added 17 species from the Boettcher material, making a total of about 73 species. The exact number is uncertain, because of a question of correct determination of some of the species recorded and the possibility of their being identical with earlier recorded forms. Edwards has accomplished a splendid piece of work in preparing this report and thus summarizing the earlier work. Doctor Baker has called my attention to the fact that several of the localities mentioned therein are misspelled and should be corrected; the mistakes presumably were caused by poorly written labels.

A list of these follows:

Nos. 5 and 17. Leite = Island of Leyte.
Kalambugan = Kolambugan, in northwestern Mindanao.
No. 7. Bagnio = Baguio, Benguet Subprovince, Luzon.
Nos. 19, 28, and 30. Port Bauge = Port Banga, southwestern Mindanao.

[1] Contribution from the Department of Entomology, Massachusetts Agricultural College.

[2] Philippine Nematocerous Diptera. I. Tipulidæ, Notulae Entomologicae 6 (1926) 33–44.

No. 32. Heightpool (?) = Haight's Place, at 8,000 feet, in the mountains above Baguio, Benguet. This is the type locality for this species (*Pselliophora pumila* Alex.).

No. 33. Calopan = Calapan, Mindoro.

No. 38. Antimonan = Atimonan, on the east coast of Luzon.

Keys to the larger and more involved genera (*Eriocera* and *Pselliophora*) are given. Bezzi [3] had earlier supplied keys to *Libnotes, Eriocera,* and *Pselliophora.* In the present report, keys to the Philippine species of *Scamboneura* and *Trentepohlia* are supplied.

TIPULINÆ

TIPULA RIVERAI sp. nov. Plate 1, figs. 1 and 2.

General coloration dark fulvous; tibial spurs lacking; wings subhyaline, the stigma dark brown; cell M_1 sessile; cell 2d A very narrow.

Male.—Length about 13.5 millimeters; wing, 15; fore leg, femur, 9.5; tibia, 11.6; basitarsus, 16.8. Frontal prolongation of head relatively short and stout, brownish yellow; nasus stout, concolorous; frontal prolongation meeting remainder of frons at an acute angle (when viewed laterally); palpi pale. Antennæ with the scapal segments yellowish brown; flagellum dark brown; all flagellar segments cylindrical with stout black setæ distributed along the outer face only, remainder of each segment with microscopic setulæ; terminal segment abruptly smaller and only half the length of the penultimate. Head dark fulvous brown, without a vertical tubercle; vertex relatively broad.

Mesonotal præscutum dark fulvous with three, very ill-defined, slightly more olive green stripes that are very narrowly margined with a reddish brown line, the median stripe further split by a capillary vitta; remainder of mesonotum fulvous, scutellum slightly darker. Pleura dark fulvous brown, indistinctly variegated with darker. Halteres relatively long, the knobs darker brown. Legs with coxæ and trochanters reddish brown; femora yellowish brown, the tips faintly darkened; tibiæ brown, the tips very narrowly blackened; tibial spurs lacking; tarsi brown, passing into brownish black; legs long, especially the tarsi, as shown by the measurements given above. Wings (fig. 1) subhyaline, the stigma and cell Sc dark brown; wing base and cell C more yellowish; wing apex vaguely more darkened; prearcular veins brown, the remaining veins black. Venation: Rs of moderate length, arcuated; R_{2+3} in alignment with the

[3] Philip. Journ. Sci. § D 12 (1917) 108–117

longer R_3; cell R_2 relatively small; cell M_1 broadly sessile; m-cu at or immediately beyond the fork of M_{3+4}; Cu_2 extending almost to wing margin; vein 2d A relatively short, cell 2d A being very narrow.

Abdominal tergites dark brown, sternites obscure yellow; fifth to eighth segments darkened to form a subterminal ring; hypopygium brown. Male hypopygium relatively small, the component sclerites of ninth segment fused into a continuous ring. Region of ninth tergite (fig. 2) terminating in two slender points that are directed caudad, separated from one another by a broad U-shaped notch which bears a small obtuse median lobule at its base; the lateral lobes are blackened and microscopically roughened on their distal half. Basistyle separated from ninth sternite only by a curved ventral suture. Ninth sternite extensive, membranous medially and here produced into a small, bilobed, fleshy structure.

LUZON, Tayabas Province, Lucban, March, 1926 (*Francisco Rivera*); a male. Named in honor of the collector, Mr. Francisco Rivera.

Tipula riverai is very distinct from any of the species of the genus known to me. The lack of tibial spurs, the peculiar arrangement of setæ on the antennæ, and the sessile cell M_1 are characters that may be held as being sufficient to warrant a new generic group for this fly.

Genus SCAMBONEURA Osten Sacken

Scamboneura OSTEN SACKEN; Berlin. Entomol. Zeitschr., 26, Heft 1 (1882) 95.

The genus *Scamboneura* was proposed by Osten Sacken for the single species then known to him, *S. dotata* Osten Sacken, from the Philippines. Since that date additional species have been described in and referred to this genus until now five species are recognized, to which number two more are added in the present paper. The great majority of the known forms are from Luzon.

Key to the Philippine species of Scamboneura Osten Sacken.

1. Antennal flagellum bicolorous, the bases of the individual segments black, the apices yellow..... 2.
   Antennal flagellum uniformly dark brown or black..... 3.
2. Mesonotal præscutum with three brown stripes, the margins of these opaque, their centers shiny and with a slight metallic luster; legs pale tawny, the tips of the femora and tibiæ darkened.
   S. dotata Osten Sacken.

Mesonotal præscutum and scutum uniformly dark gray, without stripes; legs obscure yellow, the tips of the femora and tibiæ not darkened. **S. psarophanes sp. nov.**

3. General coloration of the head and thorax fulvous yellow to yellow, without stripes; pleura pale yellow..... **S. unicolor Bezzi.**
Thoracic dorsum either plumbeous, without markings, or else yellow with three black or dark brown stripes..... 4.
4. General coloration of the thoracic dorsum and pleura grayish plumbeous. **S. plumbea Alexander.**
General coloration of the thoracic dorsum yellow with three shiny black stripes, the pleura uniformly light yellow..... **S. faceta sp. nov.**

Besides the Philippine species, the only described species are *S. vittifrons* (Walker) of Amboina, and *S. quadrata* de Meijere of Java. *Scamboneura plumbea* Alexander was omitted from Edwards's tabulation of the Philippine species.

SCAMBONEURA PSAROPHANES sp. nov.

General coloration of head yellow, posterior portion gray with a median velvety black prolongation; præscutum and scutum dark gray, without stripes; postnotal mediotergite whitish yellow with a ⊥-shaped darker marking; pleura whitish gray, variegated with darker; abdominal segments obscure yellow, the lateral margins of the tergites broadly blackened.

Female.—Length, 15.5 millimeters; wing, 11. Frontal prolongation of head light yellow, a trifle darker beneath; palpi with the basal segments yellow, the elongate terminal segment infuscated, except at base. Antennæ with the scapal segments yellow, the basal half of first segment blackened, the frons surrounding antennal fossa likewise blackened; flagellar segments elongate, bicolorous, the basal two-thirds or more black, the distal portion yellow, the latter decreasing in amount and intensity distally, the terminal four or five segments being uniformly darkened; flagellar segments with delicate, erect pubescence and short, basal verticils. Anterior vertex whitish yellow, the posterior orbits bright yellow; occipital region with a gray triangle, the anterior point extended cephalad into a linear, velvety black line.

Pronotum dark, obscure yellow medially. Dorsum of the mesonotal præscutum and scutum almost uniformly dark gray, with only the humeral triangles very slightly reddened and the anteromedian portion of scutum yellowish; scutellum grayish brown; postnotal mediotergite obscure whitish yellow with the posterior fourth dark gray, sending a median brown vitta cephalad to the cephalic margin of sclerite. Pleura whitish gray,

variegated with dark gray on anepisternum, sternopleurite, meron, and the postnotal pleuro-tergite; dorsopleural membrane light yellow. Halteres of moderate length only, pale brown, the knobs dark brown. Legs with the coxæ pale, the outer face of the fore coxa largely darkened, that of the posterior coxa a little darkened basally; trochanters, femora, and tibiæ obscure yellow, the tarsi passing into darker. Wings subhyaline, base and cell Sc brownish yellow; stigma small, darker brown; wing veins black except the basal and costal veins which are bright brown. Venation: Tips of veins R_1 and R_2 both atrophied; Rs preserved but pale; all forks of medial veins deep; m-cu on M_4 at about one-third its length beyond fork of M.

Abdomen obscure yellow, the tergites broadly and conspicuously margined laterally with black. Ovipositor with the valves relatively short and straight, reddish horn colored, the tips of the tergal valves obtusely rounded.

LUZON, Laguna Province, Mount Maquiling (*Baker*); holotype, female; paratype, female.

SCAMBONEURA FACETA sp. nov.

General coloration of head obscure orange, the occipital triangle darker; antennal flagellum black throughout; mesonotal præscutum obscure yellow with three conspicuous black stripes; pleura light yellow; legs largely brownish black; abdominal tergites obscure yellow, trivittate with brownish black, the median stripe very broad, interrupted at the caudal margins of segments.

Male, length, about 12 millimeters; wing, 12. Female, length, about 15 millimeters; wing, 13. Frontal prolongation of head yellow, nasus black; palpi pale, the outer segment passing into dark brown. Antennæ of male elongate, if bent backward extending to about opposite base of second abdominal segment; scape obscure brownish fulvous; flagellar segments black. In the female, the antennæ are much shorter. Head obscure dark orange, with a darker occipital triangle.

Pronotum narrow, obscure yellow, in the female, light orange medially. Mesonotal præscutum obscure yellow with three conspicuous black stripes, the lateral stripes straight, the interspaces very narrow; scutum obscure yellow, the lobes very extensively blackened; scutellum shiny black, a little paler caudally; postnotal mediotergite shiny brownish black, a little paler on the lateral margins. Pleura light yellow, unmarked.

Halteres brownish black, only the extreme base of stem a little paler. Legs with the coxæ and trochanters yellow; femora brown, narrowly paler at base, the outer half or more of the segments darker brown; tibiæ and tarsi brownish black. Wings subhyaline, stigma and subcostal cell brown; veins dark brown to black. Venation: Rs as in the genus, short and simulating a crossvein; distal sections of veins R_1 and R_2 atrophied; m-cu on M_4 at about one-half its length beyond the fork of M.

Abdominal tergites obscure yellow, trivittate with brownish black, the caudal margins of segments 2 to 7 narrowly and indistinctly obscure yellow; median stripe very broad, the sublateral stripes much less distinct; lateral margins of segments pale; sternites light yellow, the outer segments darker; hypopygium small, dark brown. In the female the tergites are brownish black, margined caudally with fulvous or brownish orange, the lateral margins broadly of the same color; basal sternites yellow, the outer segments duller in color; ovipositor with the valves horn colored, the long tergal valves subacute at tips.

In the paratype female the thoracic stripes are dark reddish brown instead of black.

LUZON, Tayabas Province, Alabat Island, September 18 to 30, 1926 (*Francisco Rivera*); holotype, male; allotype, female; paratype, female.

Scamboneura faceta is most closely allied to the Javanese *S. quadrata* de Meijere, from which it differs especially in the details of coloration, notably of thorax, abdomen, and legs. The general appearance of the species is very much like certain species of *Nephrotoma,* and it is highly probable that the true affinities of the genus lie with the Tipularia rather than with the Dolichopezaria, despite the venation of the medial field of the wing.

NESOPEZA CINCTITARSIS sp. nov. Plate 1, figs. 3 and 4.

General coloration light cinnamon brown, antennal flagellum black; legs dark brown, the tibial bases narrowly whitened; tarsi white, the fore and middle basitarsi with the central half blackened or strongly infuscated; wings with a dusky tinge, the small stigma darker brown; cell 2d A narrow; male hypopygium large, ninth tergite conspicuously developed.

Male, length, about 11 millimeters; wing, 10 to 10.5. Female, length, about 11 millimeters; wing, 9. Frontal prolongation of head very short, light yellow; palpi yellow, passing into

brown. Antennæ of male of moderate length only, if bent backward scarcely attaining base of abdomen; first scapal segment pale brown; second segment yellow; flagellum black; antennæ of female shorter, not attaining the wing root. Head light cinnamon, frons passing into light yellow.

Mesonotal præscutum and scutum cinnamon brown with the interspaces a little darker; scutellum darker brown; postnotal mediotergite darker brown, paler laterally. Pleura obscure yellow to brownish yellow, anepisternum and ventral portions of sternopleurite and meron a little darker. Halteres elongate, brownish black, the extreme base of stem a little paler. Legs with coxæ and trochanters pale yellow; femora dark brown, paler basally; tibiæ dark brown, narrowly whitened basally; tarsi snowy white with about the central half of basitarsi infuscated; middle tarsi with the basal whitened portion more obscured; terminal tarsal segments passing into light yellow or whitish yellow. Wings (fig. 3) with a dusky tinge, the small stigma oval, dark brown; veins brownish black. Venation: Rs longer than the penultimate section of R_1 but usually a little shorter than R_{2+3}, gently arcuated at origin; all medial cells deep; m-cu close to fork of M; cell 2d A narrow.

Abdominal tergites dark brown with a transverse obscure orange ring just beyond base of tergites 3 to 5; subterminal segments more uniformly blackened; male hypopygium conspicuously enlarged, basistyle brightened, tergite and dististyles dark brown. Male hypopygium (fig. 4) of very unusual form, the ninth tergite (*t*) greatly produced caudad and dorsad into an elevated flattened plate that is deeply divided medially by a narrow split; lateral lobes relatively narrow, each shallowly bifid on outer face near apex; ventral surface of the mesal margin of each of these lobes at near midlength bearing a slender chitinized rod that is directed cephalad and slightly laterad. Outer dististyle (*o*) an elongate, cylindrical lobe that is provided with long erect setæ. Inner dististyle (*i*) a small flattened blade, the apex suddenly narrowed into a slender point. Ovipositor with the valves chitinized, the tergal valves gently upcurved at tips.

LUZON, Tayabas Province, Lucban; at medium altitude on Mount Banahao, May, 1926; in dry forest, at base of tree, far from water (*McGregor*); holotype, male; allotype, female; paratypes, both sexes.

Nesopeza cinctitarsis is well distinguished by the remarkable male hypopygium. It is placed in the genus in the broad usage

of the name. The genus *Nesopeza* Alexander was proposed for a group of Dolichopezaria that includes *gracilis* de Meijere, *costalis* Brunetti, and *geniculata* Alexander, all species with the radial sector very long, rectangularly bent, and spurred near origin. To the genus a larger number of other species have been referred in which the sector is about as in the present species, such forms being retained in *Nesopeza* for convenience only.

LIMONIINÆ

GERANOMYIA FLAVICOSTA Brunetti. Plate 1, fig. 5.

Geranomyia flavicosta BRUNETTI, Fauna Brit. India, Dipt. Nematocera (1912) 389–390, pl. 8, fig. 2 (wing); pl. 11, fig. 6 (mesonotum).

This interesting crane fly was described from a single imperfect female specimen taken from a light aboard a launch on the Ganges Delta, India, August, 1909.

The male has not been described and the present specimen is made the allotype.

Male.—Length (excluding rostrum), about 6.5 millimeters; wing, 6.7. Differs from the description of the female in the following: Rostrum about as long as the combined head and thorax; black subterminal ring very narrow. Mesonotum shiny ferruginous, without a dark pattern as described and figured for the female. The wing pattern is very gaudy, in its general pattern suggesting the pediciine genus *Nipponomyia* Alexander and the hexatomine genus *Skuseomyia* Alexander.

Male hypopygium (fig. 5) with the basistyle (*b*) relatively small, the ventromesal lobe large, with long, conspicuous setæ. Ventral dististyle (*v*) very large, fleshy, the rostral prolongation very short, sessile, provided with a single conspicuous spikelike spine that is acute at tip. Dorsal dististyle (*d*) relatively short, only slightly curved, the tip suddenly narrowed into a slender point. Gonapophyses (*g*) broadly flattened, apex slender, gently curved to the acute tip, separated from remainder of blade by an oval notch.

LUZON, Manila, March, 1925 (*McGregor*); allotype, male.

DICRANOMYIA (THRYPTICOMYIA) APICALIS (Wiedemann). Plate 1, fig. 6; Plate 2, fig. 9.

Limnobia apicalis WIEDEMANN, Aussereur. zweifl. Insekt. 1 (1828) 551.

The crane fly described by Wiedemann as *apicalis* has long remained in doubt. Through the kindness of Dr. Hans Zerny

I was enabled to examine Wiedemann's type and to settle finally the identity of the fly, long suspected but never actually proven. The fly belongs to the subgenus *Thrypticomyia* Skuse. There has been an unfortunate confusion regarding the correct application of the specific names *apicalis* Wiedemann, *saltens* Doleschall, and *cuneiformis* de Meijere. The species determined by Brunetti [4] as *saltens* is now referred to *apicalis* by Edwards.[5] Edwards believes that the name *saltens* Doleschall (*saltans* of authors) pertains to a species of the subgenus *Euglochina* Alexander rather than to *Thrypticomyia* Skuse, a fact that is borne out by Doleschall's figure, brief description, and measurements. De Meijere considered the name *saltens* to refer to the subgenus *Thrypticomyia*. If Edwards's contention is correct, it is very probable that the name *cuneiformis* de Meijere will fall in the synonymy of *saltens* (in the subgenus *Euglochina*). If de Meijere's original beliefs are well founded, *saltens* will pertain to *Thrypticomyia* and will very possibly be found to be a synonym of the present species. The chief fact in the question that would tend to uphold de Meijere's contention lies in the curious dancing habit that Doleschall discussed for his *saltens* and which has been noted several times by other collectors for different species of *Thrypticomyia*, but not, to my knowledge, for species of *Euglochina*. Until Doleschall's material (if extant) can be examined, the problem will still remain.

McGregor sent three genera of crane flies that he found about cacao trees across the street from his house in Lucban, Tayabas Province, Luzon, in May, 1926. His interesting notes on these flies are as follows:

> The largest kind [*Conosia irrorata* Wiedemann] rests on leaves with a hind leg extended on each side—mid and fore legs together, extended in front—abdomen elevated—no motion. This fly simulates certain spiders and looks nothing like a fly.
>
> The middle-sized kind [*Trentepohlia trentepohlii* Wiedemann] rests on leaves and dances rather slowly.
>
> The smallest [*D.* (*T.*) *apicalis* Wiedemann and *D.* (*T.*) *arachnophila* sp. nov.] rests the ends of the fore tarsi on a spider-web line and dances, three or four flies sometimes resting close together on a line.

The last-mentioned habit has been discussed by earlier authors, as Osten Sacken, Jacobson (through de Meijere), Scott, Edwards, and others.

[4] Fauna Brit. Ind. Diptera, Nematocera 1 (1912) 373–374.
[5] Rec. Ind. Mus. 26 (1924) 295.

The holotype of Wiedemann's species was redescribed by me in 1921 as follows:

The type has lost the apical half of the abdomen. Wings hyaline, the cells beyond the level of the outer end of cell *1st* M_2 distinctly infuscated; stigma elongate-oval, dark brown, clearly delimited; veins dark brown, very distinct. Venation: Sc_1 ending immediately beyond the origin of *Rs*, Sc_2 some distance from its tip, Sc_1 alone being a little shorter than *m-cu;* distal section of R_1 preserved, *r* being a little longer than *m-cu;* distal section of R_2 atrophied beyond the distal margin of the stigma; inner ends of cells R_3 and *1st* M_2 about on a level, lying more basad than cell R_5; *m-cu* at near three-fourths the length of cell *1st* M_2; *M* in alignment with M_{3+4}; distal section of Cu_1 only a little longer than *m-cu.* Hind legs with the proximal third of the basitarsi blackened; on middle legs the darkening a little less extensive; fore legs lacking.

From these notes it can be seen that the absolutely critical feature, the structure of the male hypopygium, cannot be described.

The Luzon material agrees very closely with the type, except that Sc_1 ends shortly before the origin of Rs and m-cu is shorter than Sc_1 alone.

Since there are rather numerous species of *Thrypticomyia* in the Oriental Region, it is deemed advisable to redescribe and figure this species.

General appearance as in the other members of the subgenus. Verticils of the male antennæ long and conspicuous. Mesonotal præscutum very dark brown, somewhat shiny, the lateral margins of præscutum somewhat paler. Pleura obscure testaceous yellow, the dorsopleural region darker. Legs black, tarsi snowy white, only the three terminal segments slightly more yellowish white; basitarsi with about the proximal two-fifths darkened. Wings subhyaline, stigma large, oval, dark brown. Wing tip strongly infumed, this including all of the cells from slightly beyond the cord outwardly. Venation as discussed above (fig. 9): Cu_2 entirely lacking, as in the subgenus but not in *Euglochina.* Male hypopygium (fig. 6) with the ventromesal lobe of basistyle (*b*) of moderate length and stoutness. Dorsal dististyle (*d*) strongly curved, the long tip acutely pointed. Rostrum of the ventral dististyle (*v*) very long and slender, the two spines widely separated from one another, the distance between them approximately or nearly as long as the length of a single spine; the more basal of these spines arises from a short, hemispherical, enlarged base; ros-

trum beyond the last spine from two to three times as long as the length of a single spine.

The species is most closely allied to *D.* (*T.*) *fumidapicalis* Alexander, described from North Queensland, and the two may be merely geographical races. In the latter species the distal spur of R_2 is short, usually less than half the length of the vertical basal section; m-cu is usually far out toward the distal end of cell 1st M_2, though sometimes at about two-thirds the length of the cell. The macrotrichiæ of the veins do not appear so long or conspicuous as in *apicalis*. The male hypopygium (Plate 1, fig. 8) has the rostral spines closer together, the more basal arising from an elongate subconical base that is about two-thirds as long as the spine itself; the spines are much less than their own length apart; apical beak of rostrum just beyond spines relatively broad, thence narrowed strongly to tip.

DICRANOMYIA (THRYPTICOMYIA) ARACHNOPHILA sp. nov. Plate 1, fig. 7; Plate 2, fig. 10.

Male.—Length, about 5 millimeters; wing, 5 to 5.5.

Generally similar to *D.* (*T.*) *apicalis* (Wiedemann), differing in the following:

Thoracic pleura a little more variegated with brown, especially on the sternopleurite. Legs with the white more extensive, only the basal third or less of basitarsi being blackened. Wings (fig. 10) with tips slightly infumed, darkened back to the level of the outer end of cell 1st M_2. Venation: Sc_1 ending shortly before origin of Rs, Sc_2 some distance from its tip; Rs angulated and sometimes short-spurred at origin; relatively short, about as long as or a little longer than the distal spur of R_2 and in alignment with it; distal section of R_2 equal to or a little longer than the basal section, provided with from six to seven macrotrichiæ; m-cu at or before midlength of cell 1st M_2 and fully twice its own length from tip of Cu_1.

Male hypopygium of the general type of *apicalis*. Basistyle with the ventromesal lobe short and stout. Dorsal dististyle sickle-shaped with the apical spine relatively short. Ventral dististyle with the rostrum shorter and stouter (fig. 7) with the spines relatively short, placed close together, the more basal one from an enlarged tubercle that is more than half the length of the spine, the more distal spine gently recurved.

LUZON, Tayabas Province, Lucban, on spider webs, May, 1926 (*McGregor*); holotype, male; paratype, male.

The habits of this fly have been discussed under the account of the preceding species.

Genus TRENTEPOHLIA Bigot

The species of the genus in the Philippines may be separated by the following key:

Key to Philippine species of Trentepohlia Bigot.

1. Cell 1st M_2 closed, with three branches of media reaching margin (fig. 9). (Subgenus *Mongoma* Westwood.) ..... 2.
   Cell 1st M_2 open by the atrophy of m and the two distal sections of M_3; only two branches of media reaching margin (figs. 12 to 15). (Subgenus *Trentepohlia* Bigot.) ..... 4.
2. Tips of femora abruptly and conspicuously whitened; tibiæ white. **T. (M.) tenera Osten Sacken.**
   Femora brown, tips not whitened; tibiæ more or less infuscated.... 3.
3. Femora uniformly infuscated, tips of all tibiæ white; (tips of midtibiæ slightly expanded and conspicuously fringed with long white setæ). **T. (M.) pennipes Osten Sacken.**
   Femoral tips rather indistinctly darkened; tips of fore tibiæ broadly darkened; (condition of midtibiæ not known). **T. (M.) luzonensis Edwards.**
4. Femora brown, tips abruptly whitened..... **T. (T.) bakeri sp. nov.**
   Tips of femora concolorous with remainder of segment or else darkened 5.
5. Wings unmarked except for a narrow brown seam on R_2; tips of femora and tibiæ conspicuously blackened.. **T. (T.) mcgregori sp. nov.**
   Wings with a conspicuous brown pattern; femora not blackened apically ..... 6.
6. Abdomen reddish, apex black; wings yellowish subhyaline, apex dark brown; cord narrowly seamed with brown but not suffusing cell 1st R_1..... **T. (T.) trentepohlii (Wiedemann).**
   Abdomen entirely black; a dark brown costal area at sector and in cell 1st R_1, in addition to the darkened apex.. **T. (T.) pictipennis Bezzi.**

TRENTEPOHLIA (MONGOMA) TENERA Osten Sacken. Plate 2, fig. 11.

Mongoma tenera OSTEN SACKEN; Berlin. Entom. Zeitschr. 26, Heft 1 (1882) 89.

LUZON, Tayabas Province, Lucban, May, 1926; in small holes in the shady bank of a creek; at base of large forest trees, far from water (*McGregor*).

This common and widely distributed species is more variable than are most species of the genus. Osten Sacken's type (from the Philippines, collected by Semper) has the inner ends of cells 2d M_2 and M_3 about on a line, but in the present series, as well as in the material studied by Brunetti,[6] the inner end

[6] Fauna Brit. Ind. Diptera, Nematocera (1912) 480–481.

of cell M_3 lies far proximad of that of cell 2d M_2 (fig. 11), the basal section of vein M_3 being elongated and arcuated, much longer than m. Brunetti places his *pallidiventris* in the synonymy of *tenera* but, unless his original description is very erroneous, the identity of the two must be held in question.

TRENTEPOHLIA (MONGOMA) PENNIPES Osten Sacken.

Mongoma pennipes OSTEN SACKEN; Berlin. Entom. Zeitschr. 31 (1887) 204.

LUZON, Tayabas Province, Lucban, May, 1926 (*McGregor*); Alabat Island, October 8, 1926 (*Francisco Rivera*).

TRENTEPOHLIA (TRENTEPOHLIA) TRENTEPOHLII (Wiedemann).

Limnobia trentepohlii WIEDEMANN, Aussereur. zweifl. Insekt. 1 (1828) 551, pl. 6 b, fig. 12.

LUZON, Tayabas Province, Lucban, in May, 1926 (*McGregor*); numerous specimens, as discussed under the account of *Dicranomyia* (*Thrypticomyia*) *apicalis* (Wiedemann).

There has been considerable confusion concerning the identity of *trentepohlii*, but I have little doubt that the present material is correctly determined. The species has a wide range throughout the Orient, extending eastward to northern Queensland, where it was described as *T.* (*T.*) *media* Alexander, which name must be placed in the synonymy.

The species considered as being *trentepohlii* by Brunetti [7] is generally similar, but has the wing pattern much paler and the venation slightly different. I have material that was sent to me by Brunetti. This species I had earlier described as *T.* (*T.*) *doddi*, from Melville Island, North Australia. Both of these closely allied species appear to have a very extensive distribution in the Austro-Malayan Region.

TRENTEPOHLIA (TRENTEPOHLIA) MCGREGORI sp. nov. Plate 2, fig. 12.

General coloration light orange yellow; head dark colored, pruinose; legs yellow, tips of femora, bases and tips of tibiæ, and the terminal tarsal segments blackened; wings light yellow; vein R_2 narrowly seamed with brown; vein R_2 nearly transverse.

Female.—Length, 5.5 millimeters; wing, 5.

Rostrum yellow; palpi pale at base, darker outwardly. Antennæ with the scapal segments obscure yellow; flagellum broken. Head dark colored, heavily light gray pruinose.

[7] Fauna Brit. Ind. Diptera, Nematocera (1912) 482, pl. 9, fig. 13, as *Mongomioides*.

General coloration of prothorax and mesothorax bright orange yellow, unmarked. Halteres relatively short, yellow, the knobs orange. Legs with the coxæ and trochanters yellow; femora yellow, tips broadly and abruptly blackened; tibiæ yellow, bases and apices conspicuously blackened, subequal in amount, this about half as extensive as the femoral tips; basitarsi yellow, tips and remainder of tarsi dark brown. Wings (fig. 12) with a light yellow suffusion, the costal region more saturated; a narrow brown seam along vein R_2; membrane highly iridescent; veins yellow. Venation Sc_1 rather remote from tip of R_1, the distance on costa about equal to Rs; Rs shorter than the basal section of R_{4+5}; r on R_{2+3} just beyond midlength; R_2 nearly transverse, straight, relatively short.

Abdomen yellow. Ovipositor with the tergal valves horn colored, strongly upcurved.

LUZON, Tayabas Province, Lucban, May, 1926 (*McGregor*); holotype, female.

This interesting crane fly is named in honor of Mr. Richard C. McGregor, to whom I am vastly indebted for many rare Tipulidæ from the Philippines. The species resembles *T.* (*T.*) *nigroapicalis* Brunetti (India) and *T.* (*T.*) *septentrionis* Alexander (Japan) in the coloration of the legs. In all other regards the present species is very distinct. *Trentepohlia nigroapicalis* (fig. 13) has the wings unusually long and narrow, the cells of the radial field being correspondingly modified. *Trentepohlia septentrionis* (fig. 14) has the wing broader, almost as in the present species, but with vein R_2 long and oblique in position. *Trentepholia mcgregori* (fig. 12) has vein R_2 nearly perpendicular and cell R_2 relatively small.

TRENTEPOHLIA (TRENTEPOHLIA) BAKERI sp. nov. Plate 2, fig. 15.

General coloration reddish brown, mesonotum darker brown medially; antennæ black throughout; femora brown, tips narrowly but abruptly whitened; fore tibiæ white; wings subhyaline, the oval stigma slightly darker; abdomen dark brown.

Female.—Length, about 7 millimeters; wing, 5.

Rostrum brown, palpi concolorous. Antennæ black throughout, the flagellar segments elongate-oval. Head dark brown.

Pronotum dark brown, paler laterally. Mesonotal præscutum reddish brown, dark brown medially; remainder of mesonotum dark brown, especially scutellum and postnotal mediotergite. Pleura testaceous brown. Halteres relatively short, obscure yellow, the knobs a little darker. Legs with the coxæ and

trochanters yellowish testaceous; femora brown, bases paler, tips narrowly but conspicuously whitened (about 0.5 millimeter); the only leg that is still attached is a fore leg; two others are detached but mounted with the type; fore tibiæ white, those of the other legs very slightly more darkened; tarsi white, darkened outwardly. Wings (fig. 15) subhyaline, the oval stigma slightly darker, poorly delimited; Cu and the posterior cord vaguely suffused with dusky; veins pale brown, the costal region above stigma a little more yellowish. Venation: Sc_1 remote from R_1 at margin, Sc_2 not far from tip of Sc_1; Rs relatively short, nearly straight; distal ends of R_1 and r relatively faint; R_2 a trifle longer than the second section of R_{2+3}, oblique; basal section of R_{4+5} about equal to or a little shorter than the fused R_{4+5} and M_{1+2}.

Abdomen dark brown, the genital segment a little paler. Ovipositor with the tergal valves very small, acutely pointed, the sternal valves large.

LUZON, Laguna Province, Mount Maquiling (*Baker*); holotype, female.

This species is named in honor of the collector, Dr. C. F. Baker, who has added very materially to our knowledge of the fauna and the flora of the Philippines. The fly is related to *T. albogeniculata* Brunetti (India), from which it is distinguished by the diagnostic features listed above.

CONOSIA IRRORATA (Wiedemann). Plate 2, fig. 16.

Limnobia irrorata WIEDEMANN, Aussereur. zweifl. Insekt. 1 (1828) 574.

LUZON, Tayabas Province, Lucban, May, 1926 (*McGregor*).

The occurrence of this species has been discussed under the account of *Dicranomyia* (*Thrypticomyia*) *apicalis* (Wiedemann).

The males of *irrorata* have the wings very greatly dilated, as in the genus *Clydonodozus* Enderlein, the wing being widest opposite the second anal vein (fig. 16). In the female, the wings are narrower and normal in appearance.

The commonest representative of *Conosia* throughout South Africa is a small form, with the wings narrow in both sexes. I had until now considered this as being *irrorata*, but the receipt of abundant material from several stations in the Orient makes it clear that two distinct species have been confused under this name.

The South African species is described at this time.

CONOSIA ANGUSTISSIMA sp. nov. Plate 2, fig. 17.

The wing is narrow in both sexes and of approximately equal width for the entire central half of the length. The irrorate pattern is about the same in all three species of the genus, consisting of about four or five large costal blotches and abundant small irrorations at intervals along all the veins. The male hypopygium has the outer dististyle flattened, subcultriform, broadest shortly before the tip, thence suddenly narrowed into an acute apical point, the outer margin of the style with numerous subappressed spines. The gonapophyses are extremely long and slender.

Holotype, male, Pretoria, Transvaal, January 26, 1919 (*H. K. Munro*). Numerous other specimens from many parts of Natal, Transvaal, and in Damaraland. M'fongosi, Zululand, March, 1916 (*W. E. Jones*). Pietermaritzburg, Natal, January 5, 1911 (*C. Fuller*). Waterberg, Damaraland, Southwest Cape Colony, February, 1920 (*R. W. Tucker*).

ILLUSTRATIONS

[Legend: *b*, basistyle; *d*, dorsal dististyle; *g*, gonapophysis; *i*, inner dististyle; *o*, outer dististyle; *R*, radius; *r*, radial crossvein; *Sc*, subcosta; *t*, ninth tergite; *v*, ventral dististyle. Venational terminology used, Comstock-Needham-Tillyard. Hypopygial terminology used, Crampton.]

PLATE 1

FIG. 1. *Tipula riverai* sp. nov., wing.
2. *Tipula riverai* sp. nov., ninth tergite, male hypopygium.
3. *Nesopeza cinctitarsis* sp. nov., wing.
4. *Nesopeza cinctitarsis* sp. nov., male hypopygium.
5. *Geranomyia flavicosta* Brunetti; male hypopygium.
6. *Dicranomyia* (*Thrypticomyia*) *apicalis* (Wiedemann); male hypopygium.
7. *Dicranomyia* (*Thrypticomyia*) *arachnophila* sp. nov.; rostral prolongation of ventral dististyle of male hypopygium.
8. *Dicranomyia* (*Thrypticomyia*) *fumidapicalis* Alexander; rostral prolongation of ventral dististyle of male hypopygium.

PLATE 2

FIG. 9. *Dicranomyia* (*Thrypticomyia*) *apicalis* (Wiedemann); wing.
10. *Dicranomyia* (*Thrypticomyia*) *arachnophila* sp. nov., wing.
11. *Trentepohlia* (*Mongoma*) *tenera* Osten Sacken, wing.
12. *Trentepohlia* (*Trentepohlia*) *mcgregori* sp. nov., wing.
13. *Trentepohlia* (*Trentepohlia*) *nigroapicalis* Brunetti, wing.
14. *Trentepohlia* (*Trentepohlia*) *septentrionis* Alexander, wing.
15. *Trentepohlia* (*Trentepohlia*) *bakeri* sp. nov., wing.
16. *Conosia irrorata* (Wiedemann), wing, male.
17. *Conosia angustissima* sp. nov., wing, male.

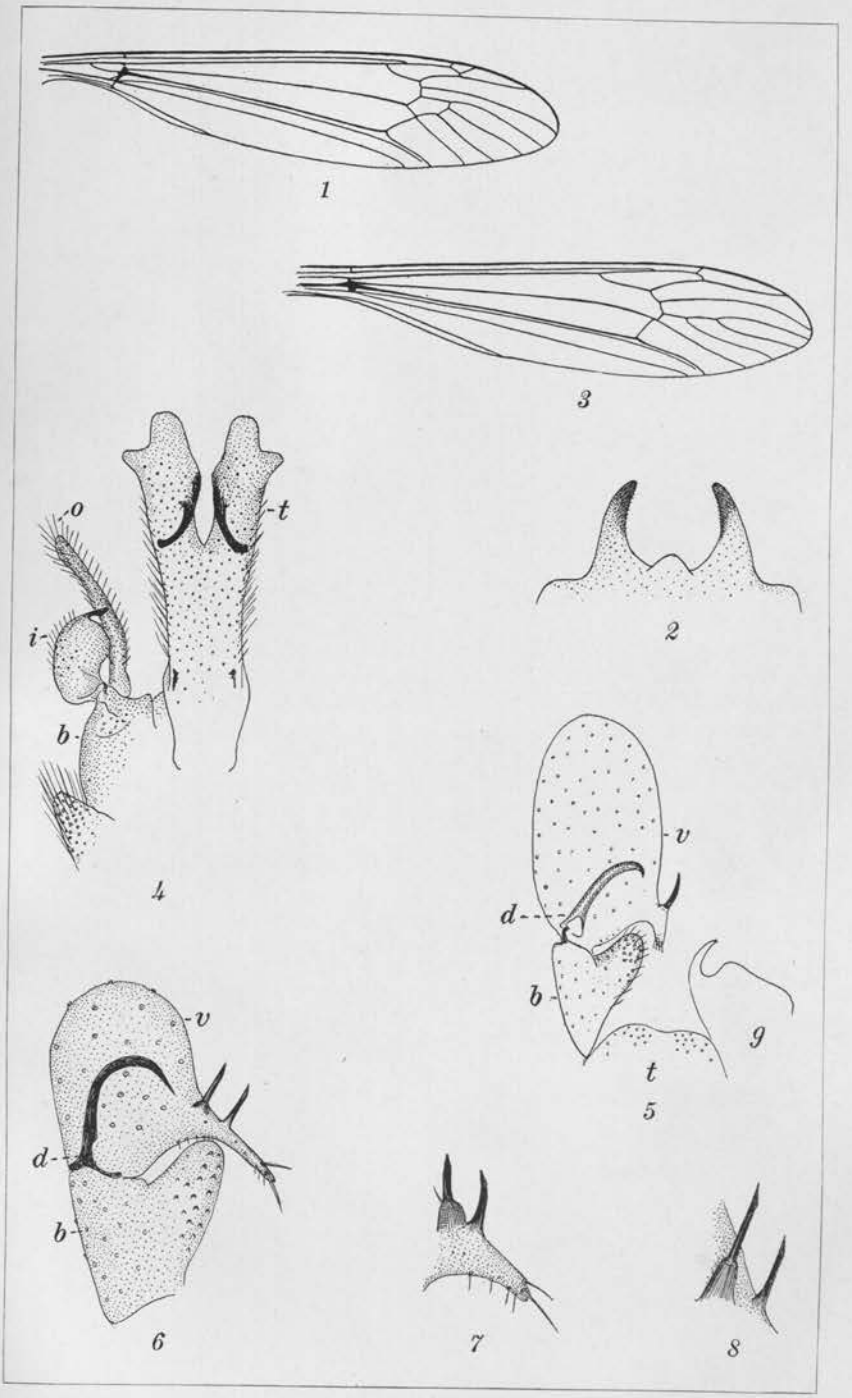

PLATE 1.

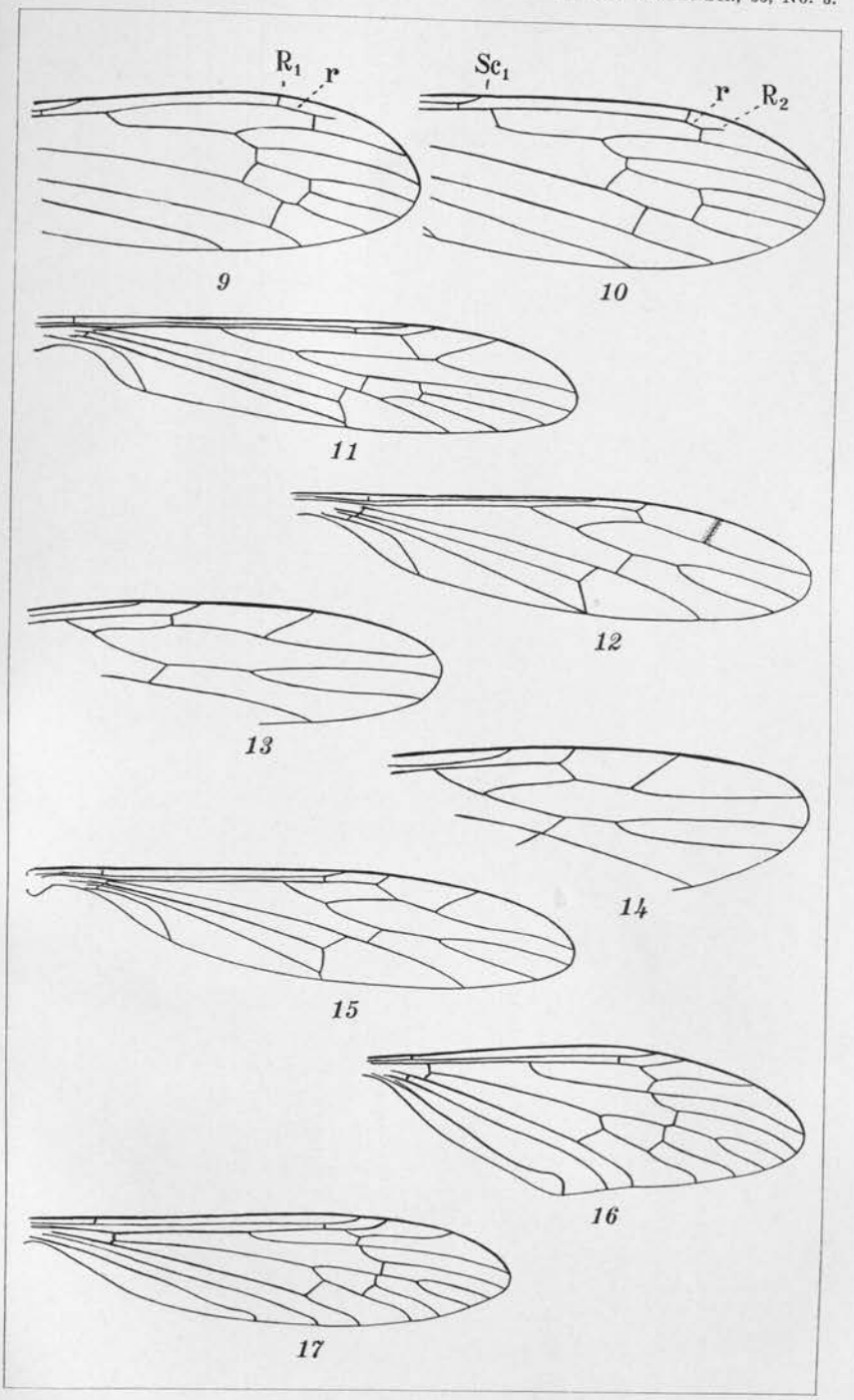

PLATE 2.

HYMÉNOPTÈRES SYCOPHILES RÉCOLTÉS AUX ILES PHILIPPINES PAR C. F. BAKER, I. AGAONINI

22me CONTRIBUTION À LA CONNAISSANCE DES INSECTES DES FIGUIERS

Par GUIDO GRANDI

Directeur du Laboratoire d' Entomologie Agraria à l' Institut Supèrieur Agraria de Bologna, Italie

SEPT PLANCHES

Les matériaux qui ont permis l'etude qui suive ont étés ramassés et envoyés par les soins de Monsieur C. F. Baker. Je lui exprime ici ma vive reconnaissance. Tous les types des espèces traitées appartiennent à ma collection.

BLASTOPHAGA CONTUBERNALIS sp. nov. Fig. 1 à 17.

FEMELLE

Dimensions.	mm.
Longueur de la tête	0.60
Largeur de la tête	0.60
Longueur du thorax	1.29
Longueur du gaster	0.93–1.00
Longueur de la tarière	0.21
Longueur des ailes antérieur	2.00
Largeur des ailes antérieur	0.86
Longueur des ailes postérieur	1.21
Largeur des ailes postérieur	0.25

Coloration fondamentale, noir bistre; régions sternopleurales thoraciques et abdominales, pattes et antennes en grande partie, terre d'ombre-bistre. Nervures et soies des ailes, terre d'ombre.

Tête à peu prés aussi longue que large entre les bords externes des yeux et pourvue de plusieurs courts poils; joues aussi longues que la moitié du plus grand diamètre des orbites. Bord antérieur de l'épistome faiblement trilobé au milieu. Antennes 10-articulées. Scape court, moins de 2 fois aussi long que sa plus grande largeur. 3me article avec la partie proximale bien tranchée et annuliforme; écaille franchement dépassant l'apex du 4me et ornée, au sommet, d'une épine assez longue. 4me article presque 2 fois aussi long qu'épais et aminci à la base. 5me article

un peu plus long qu'épais et un peu plus long que le 4me-6me, 7me, 8me, et 9me articles à peu près d'égale longueur, un peu plus longs que le 5me, un peu plus longs qu'épais, et pourvus de plusieurs soies assez longues et de 2 séries irregulières d'organs sensoriels coeloconiques allongés, pas dépassants l'apex des articles. 10me article à peu pres aussi long que l' 8me et le 9me réunis et divisé en 2 parties, chacune ornée de 2 séries irregulières d'organs sensoriels coeloconiques. Mandibules petites, plus longues que larges, faiblement bidentées. Appendice proximal aussi long que la mandibule et pourvu de 6 carènes transversales, dont la plus proximale odontoide. Maxilles avec 1 petite saille distale ornée d'une soie spiniforme.

Thorax, pronotum orné de poils assez longs en grand nombre. Praescutum du mésonotum nu, ou presque. Scapulae avec 20 poils à peu près. Scutellum orné de plusieurs poils localisés dans sa moitié postérieure et le long des bords latérals. Axillae avec 12–20 poils. Parascutella ornés de quelques poils (10 à peu près) antérieurs et externes. Métanotum pourvu de 30–40 petits poils placés, à droite et à gauche, en 2 aires sublatérales. Propodeum avec plusieurs soies en grand nombre. Chacune des aires du praepectum en posséde 15–20. Régions épimèrales bien tranchées.

Ailes antérieures un peu plus de 2 fois aussi longues que larges. Nervures pas bien individualisées et marquées presque seulement par leur couleur foncée. Nervure humérale très épaisse à sa bas et coupée en 2 morceaux, dont le premier atteint le bord alaire antérieur (bord costal) le long de ses $\frac{3}{4}$ proximals et s'amincie ensuite; le deuxième débute fluet et s'élargie jusqu'au bord costal. Cellule costale très courte, 4 ou 5 fois aussi longue que large. Cuticule alaire densément sétosulée. Pas d'organs sensoriels a l'apex de la n. stigmatique. Ailes postérieures 5 fois aussi longues que larges, avec 3 hamuli en forme de crochets.

Pattes antérieures, hanches un peu plus longues qu'un tiers des fémurs, et un peu plus que les tibias. Tarses un peu plus longs qu'une fois et demie les tibias. 1er article du tarse aussi long que les 2 articles suivants réunis. Pattes intermédiaires, fémurs franchement plus courts que les tibias; ceux-ci un peu plus courts que les tarses. Pattes postérieures, hanches aussi longues que les fémurs; ceux-ci un peu plus longs que les tibias. Tarses un peu plus de 2 fois aussi longs que les tibias.

Tarière à peu près égale au quart (ou au cinquième) de la longueur du gaster.

MÂLE

Dimensions.	mm.
Longueur de la tête	0.48
Largeur de la tête	0.45
Longueur du pronotum	0.50
Largeur du pronotum	0.78
Longueur du mésonotum	0.35
Largeur du mésonotum	0.64
Longueur du métanotum et du propodeum réunis	0.35
Largeur du métanotum	0.67
Largeur du propodeum	0.57

Coloration fondamentale, ambre ferrugineux uniforme. Parties épaisses du tégument foncées.

Tête un peu plus longue que large et pourvue de courtes soies spiniformes inclinées en arrière. Bord antérieur de l'épistome faiblement trilobé, avec le lobe médian pointu. L'entaille médiane antérieure du front atteint, en arrière, le niveau d'une ligne transverse idéale coupant à moitié les yeux. Ceux-ci bien developpés. Antennes courtes. Le scape est soudé avec la radicula. 2^{me} article un peu plus long qu'épais et rétréci à la base. 3^{me} article annuliforme; 4^{me} et 5^{me} articles presque soudés ensemble en massue; le 4^{me} est plus large que long, le 5^{me} un peu plus long que large. Soies et organes sensoriels comme dans la fig. 11. Mandibules aussi longues que larges, amincies et bidentées a l'apex. Maxilles e labium subatrophiés, en forme de bourgeon membraneux et bilobé.

Thorax, pronotum plus de 2 fois aussi large que long, pourvu de quelques petits poils; son bord antérieur saillant au milieu; ses angles antérieurs arrondis, les postérieurs très saillants. Epipleures assez larges. Prosternum soudé avec les propleurae et à surface ventrale plane. Mesonotum transversal, avec les bords laterals arrondis et pourvu de quelques poils. Métanotum soudé avec le propodeum. Ce-ci avec le bord postérieur presque droit.

Pattes antérieures, fémurs 1 fois et demie aussi longs que larges et franchement plus longs que les tibias. Tarses dimères, un peu plus courts qu'une demie fois les tibias. Pattes intermédiaires subatrophiées, en forme de bourgeons biarticulés. Pattes postérieures, hanches à peu prés aussi longues que les fémurs et un peu plus longues que les tibias. Ceux-ci très élargies à l'extremité distale et pourvues à la face interne d'une formation étrange, semblable à la valve d'une coquille. Fémurs et tibias pourvus de plusieurs soies spiniformes. Tarses pentaméres, un

peu plus courts que les tibias, mais beaucoup moins larges. Métatarses aussi longs que les 2 articles suivants réunis.

Gaster, armure génitale pourvue de 2 appendices 3–4 denticulés.

Provenance.—Cette espéces est établie sur 1,181 spécimens (539 mâles et 642 femelles), cotypes et paratypes omotopes, recueillis a Los Baños (Iles Philippines), dans les figues du *Ficus megacarpa* Merrill.

Remarque.—Mâles et femelles bien caracterisés entre tous les autres du même genre.

CERATOSOLEN BAKERI sp. nov. Fig. 18 à 32.

FEMELLE

Dimensions.	mm.
Longueur de la tête	0.99
Largeur de la tête	1.01
Longueur du thorax	1.54
Longueur du gaster	1.36
Longueur de la tarière	0.47
Longueur des ailes antérieur	2.87
Largeur des ailes antérieur	1.29
Longueur des ailes postérieur	1.79
Largeur des ailes postérieur	0.59

Coloration fondamentale, châtain-bistre, délavé par une nuance d'ambre. Surface dorsale de la tête, les 3 premiers articles des antennes, régions sterno-pleurales thoraciques et abdominales et pattes, isabelle. Nervures et soies des ailes, bistre. Articles 4me–11me des antennes, terre d'ombre clair.

Tête un peu plus large entre les bords externes des yeux que longue; ornée de poils clair-semés et très courts. Joues franchement plus longues que la moitié du plus grand diamètre des orbites. Bord antérieur de l'épistome avec 2 grands lobes submédians arrondis et ornés de quelques poils. Antennes à 11 articles, avec le scape 2 fois aussi long qu'épais. Ecaille du 3me article arrondie à son extrémité distale et dépassant à peine l'apex du 4me; celuci-ci un peu plus long qu'épais. 5me article presque une fois et demie aussi long qu'épais et pourvu en dehors de 3 séries transversales et irrégulières d'organs sensoriels coeloconiques allongés. 6me article 2 fois aussi long qu'épais, presque 2 fois aussi long que le 5me et pourvu de 3 séries transversales, très irrégulières et partialement entremêlées d'organes sensoriels coeloconiques allongés. Ceux de la série distale sont un peu saillants en dehors de l'apex de l'article. 7me et 8me articles d'égale longueur, un peu plus courts que le 6me, avec 3–4 séries

irrégulières d'organes sensoriels. 9me article aussi large que l' 8me, mais un peu plus court et pourvu de 3 séries de sensilla. 10me et 11me articles ensemble soudés en massue. Tous les 7 derniers articles du flagelle sont ornés de plusieurs soies. Mandibules un peu plus longues que larges; appendice proximal aussi long que le corps mandibulaire, amplement arrondi, avec 6 carénes. Maxilles avec 1 soie; labium avec 2 soies.

Thorax, pronotum franchement transversal; ses angles antérieurs amplement arrondis, son bord antérieur fablement rentrant. Il est orné de plusieurs soies assez longues. Scutum et scapulae du mésonotum avec un petit nombre de poils. Scutellum orné d'une 30ne de petits poils. Propodeum pourvu de quelques poils sur la région dorsale comprise entre les stigmates et de longues soies en dehors de ceux-ci.

Ailes antérieures presque 2 fois et ½ aussi longues que larges et densément sétosulées. Nervure postmarginale un peu plus d'une fois et ½ aussi longue que la n. stigmatique; cette-ci un peu plus longue que la n. marginale, qui est élargie à l'extrémité distale et pourvue d'une saille a bec d'oiseau, avec 4 petits organes sensoriels. Ailes postérieures un peu moins de 4 fois aussi longues que larges; bord antérieur pourvu de 3 hamuli.

Pattes antérieures, hanches à peu près 2 fois aussi longues que larges. Fémurs un peu plus de 2 fois aussi longs que les tibias; ceux-ci presque 2 fois aussi longs que le 1er article du tarse. Pattes intermédiaires, fémurs un peu plus courts que les tarses, dont le 1er article est aussi long que les trois articles suivants réunis. Pattes postérieures, hanches plus courtes que les fémurs et un peu plus longues que les tibias. Tarses 2 fois et demie aussi longs que les tibias, avec le premier article aussi long que les 3 articles suivants réunis.

Tarière à peu près égale au tiers de la longueur du gaster.

MÂLE

Dimensions.	mm.
Longueur de la tête	0.94
Largeur de la tête	0.64
Longueur du pronotum	0.80
Largeur du pronotum	0.68
Longueur du mésonotum	0.57
Largeur du mésonotum	0.78
Longueur du métanotum	0.28
Largeur du métanotum	0.64
Longueur du propodeum	0.71
Largeur du propodeum	0.64

Forme anophthalme, solenogastre et phanerogastre.

Coloration fondamentale, ambre ferrugineux uniforme; région médiane du mésonotum, concavités environnantes les stigmates et parties épaisses du tégument châtain-bistre.

Tête à peu près aussi longue qu'une fois et demie sa largeur. Saille trilobée antérieure du front avec la dent médiane assez accentuée. Yeux absents. Poches épicraniales des antennes amplement ouvertes au-dessus. Antennes à 6 articles (radicula exclusa). Scape un peu moins de 2 fois aussi long qu'épais. 2me article à peu près aussi long que la moitié du 1er et aminci à la base. 3me article annuliforme. 4me un peu plus large que long. 5me franchement plus long que large. 6me article un peu plus long que le 5me et arrondi a l'apex. Pour les poils et les organes sensoriels voir fig. 25.

Thorax, pronotum un peu plus long que large en arrière. Prosternum grand, bien distinct entre les propleurae et creux à la face ventrale. Mésonotum plus large que long, aplati au-dessus. Métanotum plus de 2 fois aussi large que long, bien individualisé. Propodeum un peu plus long que large, brusquement rétréci en arrière. Les deux tiers de sa surface, à droite et à gauche, sont occupés par les concavités, densément sétosulées, environnantes les stigmates.

Pattes antérieures, tibias un peu plus courts qu'une demie fois les fémurs et un peu plus longs que les tarses. Pattes intermédiaires, hanches presque 2 fois aussi longues que leur plus grande largeur et un peu plus courtes que les fémurs. Ceux-ci à peu près 3 fois aussi longs que larges et franchement plus courts que les tibias. Tibias à peu près aussi longs que les tarses. Pattes postérieures, hanches plus courts que les fémurs; ceux-ci à peu près aussi longs que les tibias. Tarses un peu plus longs que les tibias.

Abdomen, 3me tergite tout à fait caractéristique; fortement creux au milieu, mais avec les bords de la concavité faisants saille au-dessus d'elle en forme de lames minces qui se recontrent le long de la ligne médiane, en constituant une sorte de toit à la concavité.

Provenance.—Cette espèce est établie sur 556 spécimens (455 mâles et 101 femelles), cotypes et paratypes omotopes, recueillis a Los Baños (Iles Philippines), dans les figues de *Ficus pseudopalma* Blanco.

Remarque.—Espèce bien caractérisée par l'ensemble de ses traits et dédiée à M. C. F. Baker.

CERATOSOLEN IMBECILLUS sp. nov. Fig. 33 à 49.

FEMELLE

Dimensions.	mm.
Longueur de la tête	0.45
Largeur de la tête	0.47
Longueur du thorax	0.70
Longueur du gaster	0.64
Longueur de la tariere	0.04
Longueur des ailes antérieures	1.29
Largeur des ailes antérieures	0.63
Longueur des ailes postérieures	0.78
Largeur des ailes postérieures	0.21

Coloration fondamentale, châtain-bistre. Règions ventrals plus pâles. Antennes et pattes, ambre-terre d'ombre. Yeux, cramoisi-foncé.

Tête à peu près aussi longue que large entre les bords externes des yeux; joues un peu plus longues que la moitié du plus grand diamètre des orbites. Bord antérieur de l'épistome trilobé, avec les lobes latérals bien saillants et arrondis. Antennes à 10 articles. Scape un peu plus d'une fois et demie aussi long que large. 3me article avec la partie proximale aussi longue que large; l'écaille, ne dépassant pas l'apex du 4me, est pourvue d'une soie spiniforme apicale. 4me article d'une grandeur inusitée, à peu près aussi long qu'épais et orné de quelques soies assez longues et d'une série transversale d'organes coeloconiques allongés. 5me article 1 fois et demie aussi long que le 4me ou que sa plus grande largeur et pourvu de 2 séries transversales d'organes sensoriels. 6me et 7me articles à peu près d'égale longeur, un peu moins d'1 fois et demie aussi longs que le 5me et pourvus de 3 séries transversales d'organes coeloconiques. 8me et 9me articles eux mêmes à peu près d'égale longueur, mais un peu plus courts que le 6me et que le 7me; ils sont également ornés de 3 séries transversales d'organes sénsoriels. 10me article aminci à l'extrémité distale, un peu plus long que le 4me et pourvu de plusieurs organes coeloconiques trichoides et de soies; voir fig. 34. Mandibules plus longues que larges et faiblement bidentées à l'apex. Appendice proximal un peu plus court que le corps mandibulaire, arrondi en arrière et pourvu de 5 carènes transversales. Maxilles amincies en avant; chacune avec 2 soies le long de son bord ventral (externe).

Thorax, pronotum avec de soies assez longues en grand nombre. Scutum du mésonotum orné de quelques poils (12 à peu près). Scapulae avec un peu plus d'une douzaine de petites

soies. Scutellum pourvu de 24–30 poils externes, postérieurs et submédians. Axillae avec 6 petites soies, à peu près, le long de leur bord interne. Métanotum orné de quelques poils placés, à droite et à gauche, en 2 aires sublatérales. Propodeum pourvu de 30–40 soies sublatérales et latérales. Mésosternum avec quelques soies médianes-postérieures. Mésopleurae presque nues.

Ailes antérieures, un peu plus de 2 fois aussi longues que larges et assez densément sétosulées. Nervures marginale, postmarginale et stigmatique à peu près d'égale longueur. N. stigmatique élargie à l'extrémité distale et pourvue de 3 organes sénsoriels arrondis. Cellule costale un peu plus de 7 fois aussi longue que large. Ailes postérieures à peu près 4 fois aussi longues que larges et avec 3 hamuli en forme de crochets.

Pattes antérieures, hanches un peu plus cortes que les fémurs; ceux-ci 2 fois et ½ aussi longs que les tibias. Tarses 2 fois aussi longs que les tibias. 1er article du tarse un peu plus court que les tibias. Pattes intermédiaires, hanches à peu près aussi longues que les trochanters et aussi longues que les tarses. 1er article de ce-ci un peu plus long que du 5me. Pattes postérieures, hanches aussi longues que les fémurs, et un peu plus longues que les tibias; ceux-ci aussi longs que les métatarses. Tarses 2 fois et demie aussi longs que les tibias.

Gaster normal. Cercoides du 9me uromère avec 3–4 soies. Tarière à peine saillante en dehors du gaster.

MÂLE

Dimensions.	mm.
Longueur de la tête	0.54
Largeur de la tête	0.41
Longueur du pronotum	0.50
Largeur du pronotum	0.40
Longueur du mésonotum	0.30
Largeur du mésonotum	0.47
Longueur du métanotum	0.20
Largeur du métanotum	0.38
Longueur du propodeum	0.22
Largeur du propodeum	0.37

Forme phanerogastre.

Coloration fondamentale, crème-ocracé. Parties épaisses du tégument couleur de rouille. Régions membraneuses plus pâles.

Tête un peu moins d'1 fois et ½ aussi longue que large. Saille trilobée antérieure du front avec la dent médiane assez large et obtuse. Poches épicraniales faiblement ouvertes au-dessus, a moyen d'une fente graduellement rétrécie en arrière. Yeux médiocres et antérieurs. Antennes à 5 articles (radicula ex-

clusa), dont le 3me et le 4me presque ensemble soudés. Scape un peu plus court que le 5me article. 2me article franchement plus court que le 1er et 1 fois et ½ aussi long qu'épais. 3me article plus large que long. 4me plus long que large. 5me plus long que les autres. Organes sensoriels comme dans la fig. 44. Mandibules à peu près aussi longues que larges, franchement bidentées et avec la dent subapicale pourvue d'une saille odontoide assez large au bord oral.

Thorax, pronotum un peu plus long que large et graduellement aminci et arrondi en avant. Mésonotum 1 fois et demie aussi large que long, avec les bords latérals saillants et arrondis. Métanotum bien individualisé et 2 fois aussi large que long. Propodeum 1 fois et demie aussi large que long, avec le bord postérieur presque droit.

Pattes antérieures, fémurs presque 3 fois aussi longs qu'épais. Tibias un peu plus longs qu' 1 tiers de la longueur des fémurs et un peu plus longs que les tarses. 2me article du tarse plus long que le 1er. Pattes intermédiaires, hanches un peu plus courtes que les fémurs et les trochanters ensemble réunis. Fémurs 1 fois et demie aussi longs qu'épais. Tibias à peu près aussi longs que les hanches; quelque peu soudainement élargies a l'extrémité distale et pourvues de formations odontoides tres voyantes (fig. 48). Tarses aussi longs que les tibias, avec le 1er article à peu près aussi long que le 5me. Pattes postérieures, hanches un peu plus courtes que les fémurs. Tibias franchement plus courts que les fémurs, à peu près aussi longs que les tarses et 3 fois aussi longs qu'épais. Métatarse aussi long que le 5me article. 2me, 3me, et 4me articles transversaux.

Provenance.—Cette espèce, très bien caractérisée, est établie sur 2,056 spécimens (1,510 mâles et 546 femelles), cotypes et paratypes omotopes, recueillis à Singapore (Malacca), dans les figues du *Ficus chartacea* Wall.

CERATOSOLEN PYGMAEUS sp. nov. Fig. 50 à 66.

FEMELLE

Dimensions.	mm.
Longueur de la tête	0.31
Largeur de la tête	0.28
Longueur du thorax	0.44
Longueur du gaster	0.41
Longueur de la tarière	0.08
Longueur des ailes antérieures	1.00
Largeur des ailes antérieures	0.43
Longueur des ailes postérieures	0.60
Largeur des ailes postérieures	0.08

Coloration fondamentale, ferrugineux; terre d'ombre dans les régions à tégument épais. Face ventrale de la tête, du corps et pattes, jaune-blanchâtre. Antennes, ambre.

Tête un peu plus large entre les bords externes des yeux que longue. Bord antérieur de l'épistome avec 2 grands lobes submédians arrondis; lobe médian assez saillant. Joues un peu plus courtes du plus grand diamètre des orbites. Bord postérieur de la tête peu développé et coupé presque droit en arrière. Antennes à 11 articles, dont les 3 derniers réunis ensemble en massue. Scape à peu près 2 fois aussi long qu'épais. Ecaille du 3me article assez dépassant l'apex du 4me. Celui-ci un peu moins d'1 fois et ½ aussi long qu'épais; 5me article un peu plus long que le 4me, et aussi long que le 7me et le 8me. Ceux-ci sont néanmoins plus épais a l'apex des précédents. Massue (9me, 10me, et 11me articles) plus de 2 fois aussi longue que large et sensiblement amincie à l'extrémité distale, à cause de la ténuité du dernier article. Mandibules franchement plus longues que larges, avec la face ventrale pourvue d'une dizaine de carènes. Dent apicale très grande, aigue, courbée en croissant et entaillée à l'apex dans la mandible gauche. Dent subapicale aigue, mais peu saillante. Appendice proximal à peine plus court du corps mandibulaire, arrondi et pourvu de 9 carènes transversales. Maxilles et labium comme dans la fig. 55.

Thorax, pronotum orné de quelques poils assez longs. Scutum du mésonotum subglabre. Scapulae avec 3–4 poils. Scutellum ornés de 8 poils, à peu près. Métanotum pourvu d'une dizaine de petits poils. Propodeum avec un certain nombre de petites soies laterales.

Ailes antérieures un peu plus de 2 fois aussi longues que larges, franchement rétrecies à la base et densément revêtues de poils. Cellule costale très longues et ornée de quelques poils. Nervure marginale un peu plus courte que la n. stigmatique; cette-ci élargie a l'extrémité distale et pourvue d'une saille a bec d'oiseau et de 4 petits organes sensoriels ronds et alignés. N. postmarginale subatrophiée. Soies du bord de l'aile remarquablement longues. Ailes postérieures 8 fois aussi longues que larges.

Pattes antérieures, fémurs plus longs que les hanches, 2 fois et ½ aussi longs qu'épais, et 2 fois aussi longs que les tibias. Tarses un peu plus courts que les fémurs et presque 2 fois aussi longs que les tibias. 1er article à peu près aussi long que le 5me. Pattes intermédiaires, tibias franchement plus longs que les

fémurs. Tarses à peu prés aussi longs que les tibias. Pattes postérieures, hanches à peu près aussi longues que les fémurs; ceux-ci plus longs que les tibias. Tarses 2 fois aussi longs que les tibias, avec le 1er article à peu près aussi long que les 3 suivants réunis.

Tarière à peu près égale au tiers de la longueur du gaster.

MÂLE

Dimensions.	mm.
Longueur de la tête	0.33
Largeur de la tête	0.27
Longueur du pronotum	0.28
Largeur du pronotum	0.22
Longueur du mésonotum	0.12
Largeur du mésonotum	0.27
Longueur du métanotum	0.11
Largeur du métanotum	0.27
Longueur du propodeum	0.10
Largeur du propodeum	0.20

Forme phanerogastre.

Coloration fondamentale, crème. Mandibules, ferrugineux. Gaster jaune paille blanchâtre.

Tête un peu plus large que longue. Saille trilobée antérieure du front avec la dent médiane peu saillante. Poches épicraniales des antennes en partie ouvertes au-dessus. Antennes à 4 articles (radicula exclusa). 2me article un peu plus court que le scape et à peu près 1 fois et demie aussi long qu'épais. 4me à peu près aussi long qu'épais.

Thorax, pronotum plus long que large, avec le bord antérieur arrondi et les bords latérals divergents en arrière. Angles postérieurs faiblement saillants. Mésonotum transversal. Métanotum presque aussi large que le mésonotum, pareillement transversal et pas bien individualisé du propodeum. Celui-ci plus large que long, franchement moins large que le métanotum, avec les angles postérieurs arrondis et le bord postérieur presque coupé droit.

Pattes antérieures, fémurs 1 fois et demie aussi longs que les hanches et à peu près 2 fois aussi longs que les tibias. Pattes intermédiaires, hanches un peu plus courtes que les fémurs et 3 fois aussi longues que les trochanters. Tibias un peu plus longs que les fémurs et remarquablement plus longs que les tarses. Ceux-ci trimères, avec les griffes bien développées. La patte est pourvue d'un petit nombre de poils; pour leur distribution voir la fig. 64. Pattes postérieures, hanches à peu près

aussi longues que les fémurs; ceux-ci aussi longs que les tibias, qui sont ornés de formations odontoides, comme dans la fig. 65. Tarses trimères, un peu plus courts que les tibias. Métatarses à peu près aussi longs que le 3me article, et plus longs que le 2me. Griffes bien développées.

Provenance.—Cette espèce est établie sur 25 spécimens (9 màles et 16 femelles), cotypes et paratypes omotopes, recueillis au Mt. Maquiling en Luzon (Iles Philippines), dans les figues du *Ficus minahassae* Miquel.

Remarque.—Forme bien caractérisée par sa petitesse et par l'oligomerie de tarses médians et postérieurs.

CERATOSOLEN JUCUNDUS sp. nov. Fig. 67 à 83.

FEMELLE

Dimensions.	mm.
Longueur de la tête	0.53
Largeur de la tête	0.44
Longueur du thorax	0.68
Longueur du gaster	0.71
Longueur de la tarière	0.08
Longueur des ailes antérieures	1.56
Largeur des ailes antérieures	0.76
Longueur des ailes postérieures	0.96
Largeur des ailes postérieures	0.17

Coloration fondamentale du corps, ocracé delavé. Tête (et d'une manière particulière sa surface dorsale postérieure), mandibules, quelques régions du mésonotum et du métanotum, et 5 bandes transversales aux urotergites 3–7, terre d'ombre ferrugineux. Antennes, ambre; pattes, ambre-clair; yeux, cramoisi foncé.

Tête plus longue que large, avec les angles postérieurs assez saillants. Joues un peu moins longues que le plus grand diamètre des orbites. Bord antérieur de l'épistome avec les 2 lobes submédians tres saillants et arrondis; lobe médian à peine saillant. Soies comme les montre la fig. 67. Antennes à 11 articles, dont les 2 derniers réunis en massue. Scape un peu moins long que 2 fois sa largeur. Ecaille du 3me article pas dépassant l'apex du 4me. 3me article orné de 2 soies spiniformes subproximales et de quelques autres soies. 4me article un peu plus long qu'épais. 5me article franchement plus grand que le 4me, et remarquablement plus long qu'épais. 6me article plus long que le 5me et à peu près 1 fois et demie aussi long qu'épais. 7me,

8me, et 9me articles à peu près d'égale longueur et presque aussi longs que le 6me. 10me article aussi long que le 9me. 11me aussi long que le 10me. 5me–11me articles ornés de plusieurs soies et d'une série transversale d'organs sensoriels allongés. Mandibules plus longues que larges, avec la surface ventrale munie de 9–10 carènes. Dent apicale courte et aigue, dent subapicale courte et arrondie. Appendice proximal un peu plus court du corps de la mandibule et pourvu de 6–7 carènes transversales, dont la prèmière avec une saille odontoide. Maxilles pourvues d'une longue saille bacillaire munie d'une soie, et d'une soie subdistale. Labium avec une soie subdistale et ventrale.

Thorax, pronotum orné d'un certain nombre de soies assez longues. Scutum du mésonotum nu. Scapulae avec 4–6 soies laterales et postérieures. Scutellum avec une demie douzaine de soies assez longues et à peu prè 20 poils subpostérieurs. Axillae avec quelques petites soies. Métanotum pourvu de 2 groupes sublatérals de quelques poils (3 dans les spécimens examinés). Propodeum avec un petit nombre de soies latérales et sublatérales.

Ailes antérieures à peu près 2 fois aussi longues que larges. Cellule costale 10 fois aussi longue que large et ornée de plusieurs poils. Nervure marginale presque aussi longue que la n. stigmatique et plus courte que la n. post-marginale. N. stigmatique élargie à l'extrémité et pourvue d'une petite saille avec 3 organs sensoriels. La chaetotaxie est indiquée dans la fig. 71. Ailes postérieures à peu près 5 fois et demie aussi longues que larges. Bord antérieur avec 3 hamuli, dont 2 en forme de crochets.

Pattes antérieures, fémurs plus longs que les hanches et à peu près 2 fois et demie aussi longs qu'épais. Tibias (dents comprises) presque aussi longs que la moitié des fémurs et un peu plus longs que la moitié des tarses. Ceux-ci avec le 1er article plus long que le 5me. Pattes intermédiaires, trochanters presque aussi longs que les hanches. Fémurs un peu plus courts que les tibias; ceux-ci à peu près aussi longs que les tarses. 1er article du tarse aussi long que le 2me et le 3me ensemble réunis. Pattes postérieures, tibias aussi longs que les $\frac{3}{4}$ des fémurs et un peu moins que la moitié des tarses. Métatarses un peu plus longs que les 3 articles suivants ensemble réunis.

Tarière à peu près égale au neuvième de la longueur du gaster.

MÂLE

Dimensions.	mm.
Longueur de la tête	0.45–0.47
Largeur de la tête	0.35–0.40
Longueur du pronotum	0.57–0.57
Largeur du pronotum	0.41–0.45
Longueur du mésonotum	0.33–0.34
Largeur du mésonotum	0.44–0.45
Longueur du métanotum	0.24–0.18
Largeur du métanotum	0.43–0.48
Longueur du propodeum	0.25–0.28
Largeur du propodeum	0.31–0.31

Forme anophthalme et phanerogastre.

Coloration fondamentale, ocracé blanchâtre. Régions épaisses du tégument, terre d'ombre-bistre. Régions membraneuses, couleur de crème blanchâtre.

Tête franchement plus longue que large. Il y a de spécimens pourvus d'une tête proportionellement plus large et lourde (voir fig. 78). Saille antérieure du front munie de 2 petits coins latérals; entre eux le bord antérieur est largement creusé. Poches épicraniales des antennes amplement ouvertes au-dessus; de ce-ci découle que la saille susnommée est très longue, un peu plus de 2 fois et demie aussi longue que large en avant. Antennes à 5 articles (radicula exclusa). 2^{me} article un peu plus long qu'épais et aussi long que la moitié du scape. 3^{me} article plus court que le 2^{me} et plus court qu'épais. 4^{me} plus long que le 2^{me} et plus court que le scape. 5^{me} article à peu près aussi long que le scape.

Thorax, pronotum à peu près 1 fois et demie aussi long que large et franchement aminci en avant. Mésonotum plus large que long, subtrapézoidal. Métanotum bien individualisé, 2 fois et demie aussi large que long, avec les bords latérals arrondis et le bord postérieur creusé. Propodeum un peu plus large que long, avec les bords latérals faiblement convergents en arrière et le bord postérieur pareillement creusé. La chaetotaxie est indiquée dans la fig. 79.

Pattes antérieurs, fémurs un peu mois de 2 fois aussi longs que les hanches et un peu plus de 2 fois aussi longs que les tibias (dents comprises). Tarses dimères, aussi longs que les tibias (dents exceptées). Pattes intermédiaires, hanches un peu plus de 2 fois aussi longues que les trochanters et un peu plus longues que les fémurs. Tibias un peu plus longs que les fémurs et à peu près aussi longs que les tarses. Ceux-ci quelquefois pentamères, quelquefois tetramères. Dans les derniers

le 1er article est aussi long que les 2 suivants ensemble réunis, et plus court que le 4me. Dans les premiers le 1er article est aussi long que les 3 suivants ensemble réunis. Pattes postérieures, hanches à peu près aussi longues que les fémurs ou un peu plus courtes que ceux-ci. Tibias plus courts que les fémurs et pourvus de quelques dents, dont la disposition est indiquée par la fig. 83. Tarses un peu plus longs que les tibias, pentamères. Métatarses aussi longs que les 3 articles suivants ensemble réunis. Fémurs de toutes les 3 paires de pattes avec le bord dorsal muni d'un petit coin aigu.

Provenance.—Cette espèce est établie sur 1,413 spécimens (344 mâles et 1,069 femelles), cotypes et paratypes omotopes, recueillis au Mt. Maquiling en Luzon (Iles Philippines), dans les figues du *Ficus hauili* Blanco.

EUPRISTINA BAKERI sp. nov. Fig. 84 à 100.

FEMELLE

Dimensions.	mm.
Longueur de la tête	0.43
Largeur de la tête	0.44
Longueur du thorax	0.73
Longueur du gaster	0.80
Longueur de la tarière	1.14
Longueur des ailes antérieures	1.49
Largeur des ailes antérieures	0.63
Longueur des ailes postérieures	0.84
Largeur des ailes postérieures	0.25

Coloration fondamentale de la surface dorsale de la tête, du thorax et du gaster, châtain-bistre. Régions ventrales, les 3 premiers articles des antennes et pattes, ambre-isabelle; articles 4–11 des antennes, terre d'ombre clair. Régions membraneuses de la tête et de l'abdomen, blanc sale.

Tête à peu près aussi longue que large entre les bords externes des yeux. Joues un peu plus courtes que le plus grand diamètre des orbites. Bord antérieur de l'épistome avec 2 grands lobes submédians arrondis et avec le lobe médian bien saillant et arrondi à l'apex. Bord postérieur de la tête peu saillant en arrière, presque droit dans le milieu et avec les angles arrondis. Antennes, scape 2 fois aussi long qu'épais. 4me article à peu près aussi long qu'épais. 5me et 6me articles un peu plus longs que le 4me (5me un peu plus court qu'épais, 6me un peu plus long qu'épais). 7me article à peu près aussi long que le 5me et le 6me ensemble réunis, et franchement plus long qu'épais. 8me et 9me

articles à peu près aussi longs qu'épais et un peu plus courts que le 7me. 10me article plus court que le 9me et un peu plus court qu'épais. 11me presque aussi long que le 7me, mais franchement moins large que celui-ci. 5me et 6me articles avec 1 série transversale d'organs sensoriels coeloconiques allongés, un peu, ou point, saillants en dehors de l'apex. 7me article avec 3, 8me–10me avec 1–2 séries irrégulières et transversales de pareils organs, dont la série distale franchement saillante en dehors. 11me article avec 1–2 séries des mêmes organs. Mandibules une fois et demie aussi longues que larges, avec la dent apicale courte et aigue. Surface ventrale avec 6 carènes transversales. Appendice proxima 1 fois et demie aussi long que le corps mandibulaire, pourvu de 9 carènes transversales et, le long du bord interne, de 5 sailles odontoides, dont la 5me est soudée avec la carène correspondente. Maxilles et labium comme dans la fig. 90.

Thorax, pronotum orné de poils irrégulièrement insérés. Scutum du mésonotum pourvu, dans les spécimens examinés, de 14–16 poils, réunis en 2 groupes sublatérals et subpostérieurs. Scapulae avec 8–10 petites soies subexternes. Scutellum orné d'une 30ne de poils. Axillae avec 10–12 petites soies.

Ailes antérieures un peu moins de 2 fois et demie aussi longues que larges. Nervure humérale aussi longue que les $\frac{3}{4}$ de la longueur de l'aile. Soies comme dans la fig. 91. Ailes postérieures 3 fois et demie aussi longues que larges. Bord antérieur avec 3 hamuli, dont 1 droit, les autres en forme de crochets.

Pattes antérieures, hanches 2 fois aussi longues que larges. Fémurs un peu plus de 2 fois aussi longs qu'épais. Tibias un peu plus courts que la moitié des fémurs. Tarses 1 fois et demie aussi longs que les tibias, avec le 1er article aussi long que les 3 suivants réunis. 5me article un peu plus court que le 1er. Pattes intermédiaires, fémurs plus de 4 fois aussi longs qu'épais et 3 fois aussi longs que les trochanters. Tibias un peu plus longs que les fémurs. Tarses un peu plus courts que les tibias, avec le 1er article un peu plus long que les 2 suivants réunis. 5me article un peu plus long que le 2me. Pattes postérieures, tibias un peu plus longs que la moitié des fémurs. Tarses 3 fois aussi longs que les tibias, avec le 1er article un peu plus long que les tibias et aussi long que les 3 articles suivants réunis.

Tarière un peu moin d'une fois et un tiers aussi longue que le gaster.

MÂLE

Dimensions.	mm.
Longueur de la tête	0.37
Largeur de la tête	0.42
Longueur du pronotum	0.61
Largeur du pronotum (antérieure)	0.58
Largeur du pronotum (postérieure)	0.61
Longueur du mésonotum + métanotum + propodeum	0.57
Largeur du mésonotum	0.53
Largeur du propodeum	0.31

Coloration fondamentale de la tête, du thorax et de pattes, ambre-ferrugineux. Parties épaisses du tégument, bistre. Gaster, ambre clair, avec la surface dorsale plus épaisse des uromères, ambre-ferrugineux.

Tête un peu plus large que longue, avec les bords latérals très saillants et arrondis en arrière des yeux. Antennes à 4 articles. 2me article à peu près aussi long qu'épais. 3me annuliforme, 2 fois et demie aussi long qu'épais. Mandibules comme les montre la fig. 96.

Thorax, pronotum plus large que long; sa partie antérieure pas trop amincie en avant et avec les angles largement arrondis. Prosternum et propleurae comme dans l' *Eupristina grassii* Grnd. Mésonotum, métanotum et propodeum ensemble soudés. Mésonotum aussi large que la longueur totale des 3 segments nommés. Propodeum distinctement plus aminci en arrière que celui de *E. grassii* Grnd.

Pattes antérieures, tibias aussi longs que la moitié des fémurs. Tarses franchement plus courts que les tibias et avec le 1er article pourvu de 2 dents courbées en croissant. Pattes intermédiaires, fémurs à peu près aussi longs qu'épais. Tibias un peu plus courts que les fémurs et que les tarses. Ceux-ci à peu près aussi longs que les fémurs. 1er article plus court que les 2 suivants réunis. Pattes postérieures, tibias presque aussi longs que la moitié des fémurs. Tarses un peu plus longs que les tibias.

Provenance.—Cette espèce est établie sur 312 spécimens (62 mâles et 250 femelles), cotypes et paratypes omotopes, recueillis a Los Baños (Iles Philippines), dans les figues du *Ficus forstenii.*

Remarque.—Espèce très voisine de *E. grassii* Grnd. Elle s'en distingue néanmoins par plusieurs traits.

BLASTOPHAGA BROWNI Ashmead.

Parmi les espèces envoyées par M. Baker, il y a un *Blastophage* rencontré dans les figues du *Ficus heterophylla* L., qui ne posséde pas de caractères suffisants à ne pas le confondre avec l'espèce que M. Baker même a recueillie, aux Philippines, dans les sycones du *Ficus ulmifolia*. Cette dernière forme avait-été déja ramassée aux Philippines, dans le même figuier, par F. X. Williams, et j'en posséde quelques spécimens envoyés par M. P. H. Timberlake de Honolulu et classés par M. A. B. Gahan *Blastophaga browni* Ashmead.

Je ne sais pas donc quelle conclusion tirer à cet égard. Est-ce que *Ficus heterophylla* et *F. ulmifolia* sont intimement alliés entre eux? Les naturalistes qui séjournent dans le pays pourront, peut-être, résoudre la question.

ILLUSTRATIONS

Planche 1

Figs. 1 à 9. *Blastophaga contubernalis* sp. nov., femelle.

1. Tête.
2. Antenne.
3. 3me et 4me articles de l'antenna.
4. Mandibule.
5. Maxille.
6. Ailes.
7. Patte antérieure.
8. Patte intermédiaire.
9. Patte postérieure.

10 à 14. *Blastophaga contubernalis* sp. nov., mâle.

10. Tête.
11. Antenne.
12. Mandibule.
13. Thorax.
14. Région mésosternale avec une patte subatrophiée.

Planche 2

15 à 17. *Blastophaga contubernalis* sp. nov., mâle.

15. Patte antérieure.
16. Patte postérieure.
17. Armure génitale; *a*, periphallum; *m*, membrane intersegmentale; *p*, penis.

18 à 24. *Ceratosolen bakeri* sp. nov., femelle.

18. Tête.
19. Antenne.
20. Mandibule.
21. Maxilles et labium.
22. Ailes.
23. Patte antérieure.
24. Patte intermédiaire.

Fig. 25. *Ceratosolen bakeri* sp. nov., mâle. Antenne.

Planche 3

Fig. 26. *Ceratosolen bakeri* sp. nov., femelle. Patte postérieure.

Figs. 27 à 32. *Ceratosolen bakeri* sp. nov., mâle.

27. Tête.
28. Mandibule.
29. Thorax.
30. Patte antérieure.
31. Patte intermédiaire.
32. Patte postérieure.

33 à 42. *Ceratosolen imbecillus* sp. nov., femelle.

33. Tête.
34. Antenne.
35. Mandibule.
36. Maxilles et labium.
37. Ailes.
38. Portion, plus grossie, de l'aile avec les n. marginale, post-marginale et stigmatique.
39. Moitié droite du propodeum.
40. Patte antérieure.
41. Patte intermédiaire.
42. Patte postérieure.

PLANCHE 4

FIGS. 43 à 49. *Ceratosolen imbecillus* sp. nov., mâle.

43. Tête.
44. Antenne.
45. Mandibule.
46. Thorax.
47. Patte antérieure.
48. Patte intermédiaire.
49. Patte postérieure.

50 à 60. *Ceratosolen pygmaeus* sp. nov., femelle.

50. Tête.
51. Antenne.
52. Articles 4^{me} à 9^{me} (le dernier coupé) de l'antenne, plus grossis.
53. Mandibule droite.
54. Mandibule gauche.
55. Maxilles.
56. Ailes.
57. Portions, plus grossie, de l'aile antérieure avec les n. marginale, post-marginale et stigmatique.
58. Patte antérieure.
59. Patte intermédiaire.
60. Patte postérieure.

61 à 65. *Ceratosolen pygmaeus* sp. nov., mâle.

61. Tête.
62. Antenne.
63. Patte antérieure.
64. Patte intermédiaire.
65. Patte postérieure.

PLANCHE 5

FIG. 66. *Ceratosolen pygmaeus* sp. nov., mâle. Thorax.
FIGS. 67 à 75. *Ceratosolen jucundus* sp. nov., femelle.

67. Tête.
68. Antenne.
69. Mandibule.
70. Maxilles et labium.
71. Ailes.
72. Portion, plus grossie, de l'aile antérieure avec la n. stigmatique.
73. Patte antérieure.
74. Patte intermédiaire.
75. Patte postérieure.

FIG. 76. *Ceratosolen jucundus* sp. nov., mâle. Antenne.

PLANCHE 6

FIGS. 77 à 83. *Ceratosolen jucundus* sp. nov., mâle.

77. Tête.
78. Tête d'un des spécimens plus lourdes.
79. Thorax.
80. Patte antérieure.
81. Patte intermédiaire avec tarse tetramère.
82. Patte intermédiaire avec tarse pentamère.
83. Patte postérieure.

84 et 85. *Eupristina bakeri* sp. nov., femelle.

84. Patte postérieure.
85. Patte intermédiaire.

PLANCHE 7

FIGS. 86 à 93. *Eupristina bakeri* sp. nov., femelle.

86. Tête.
87. Portion, plus grossie, du bord antérieur de l'épistome.
88. Antenne.
89. Mandibule.
90. Maxilles et labium.
91. Ailes.
92. Apex de la n. humérale.
93. Patte antérieure.

94 à 100. *Eupristina bakeri* sp. nov., mâle.

94. Tête.
95. Antenne.
96. Mandibule.
97. Thorax.
98. Patte antérieure.
99. Patte intermédiaire.
100. Patte postérieure.

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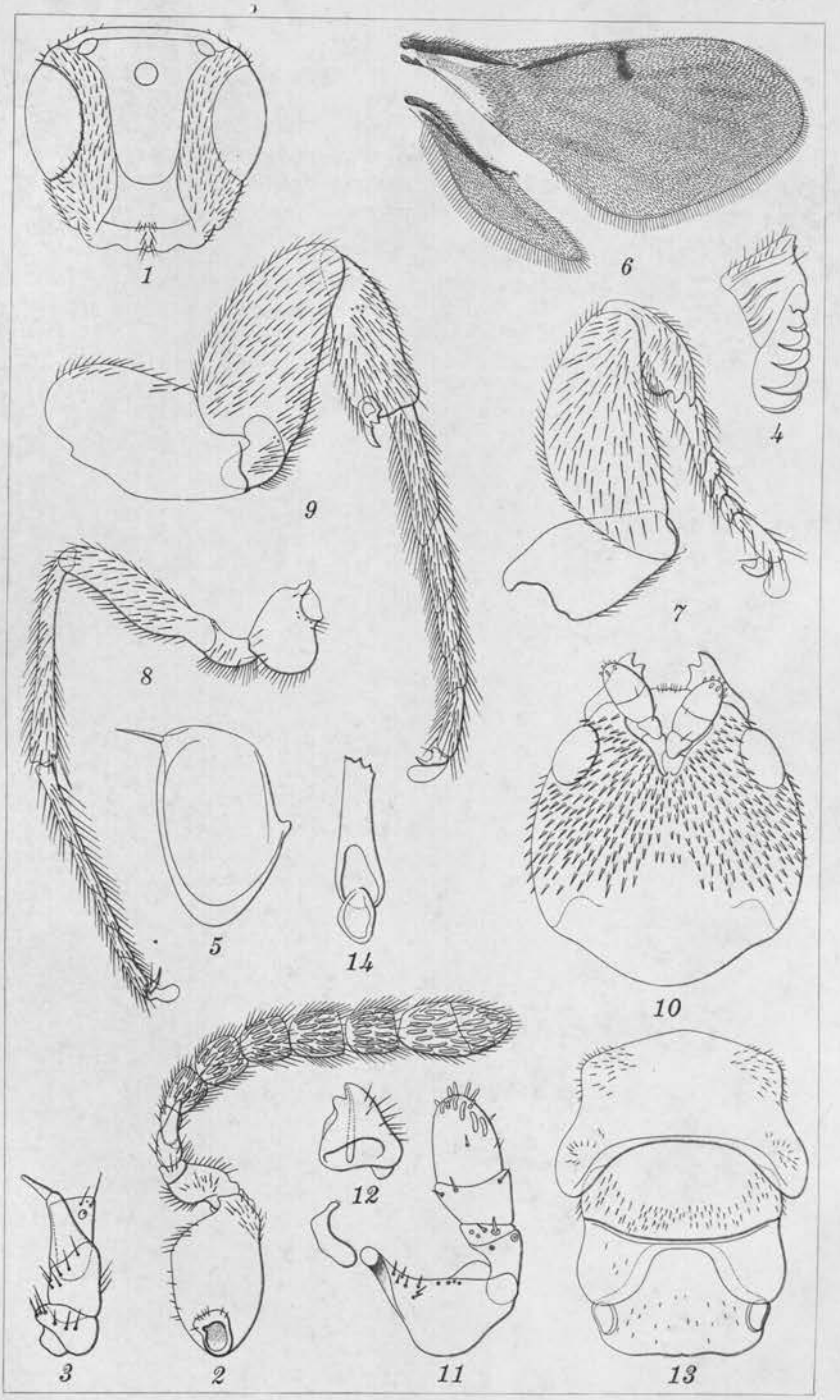

PLANCHE 1.

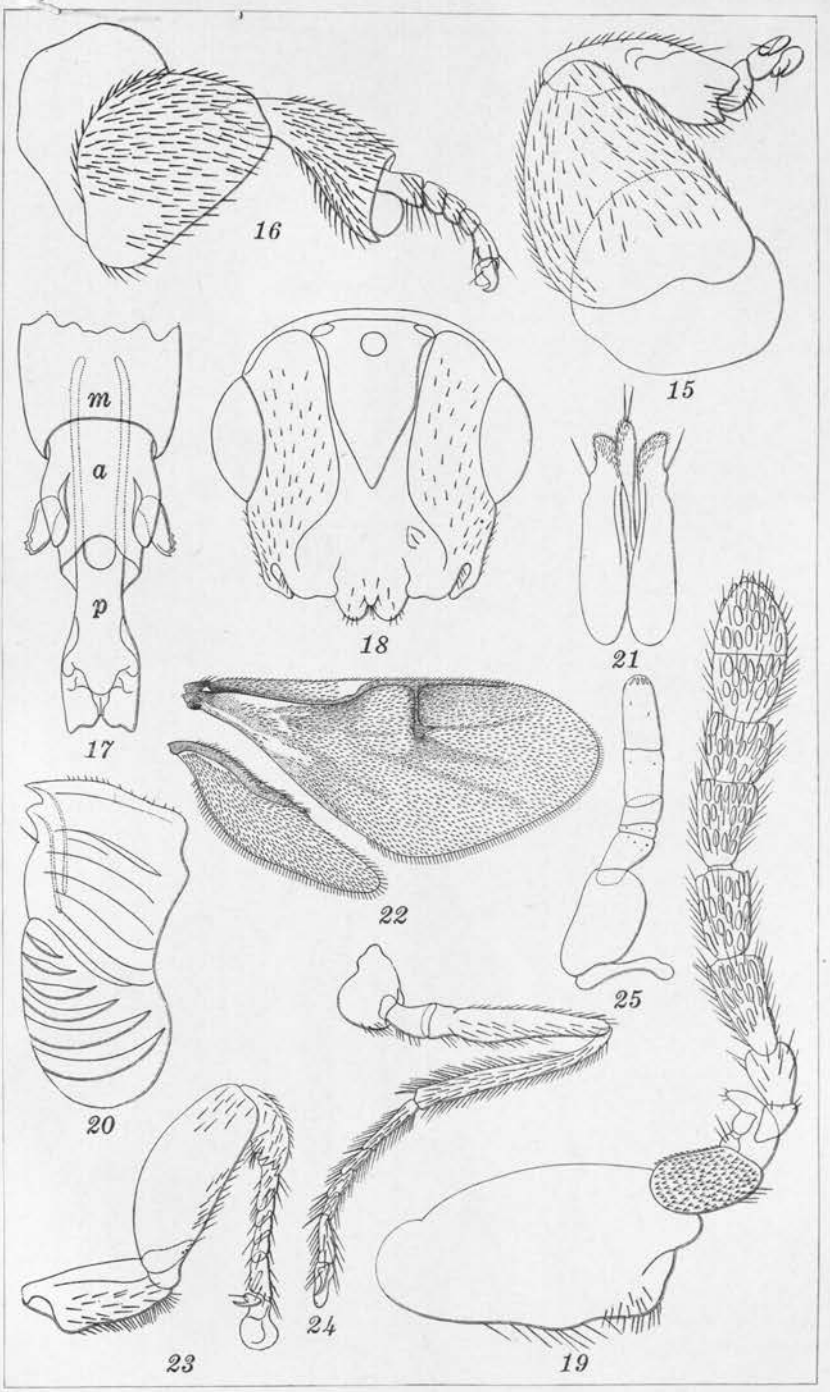

PLANCHE 2.

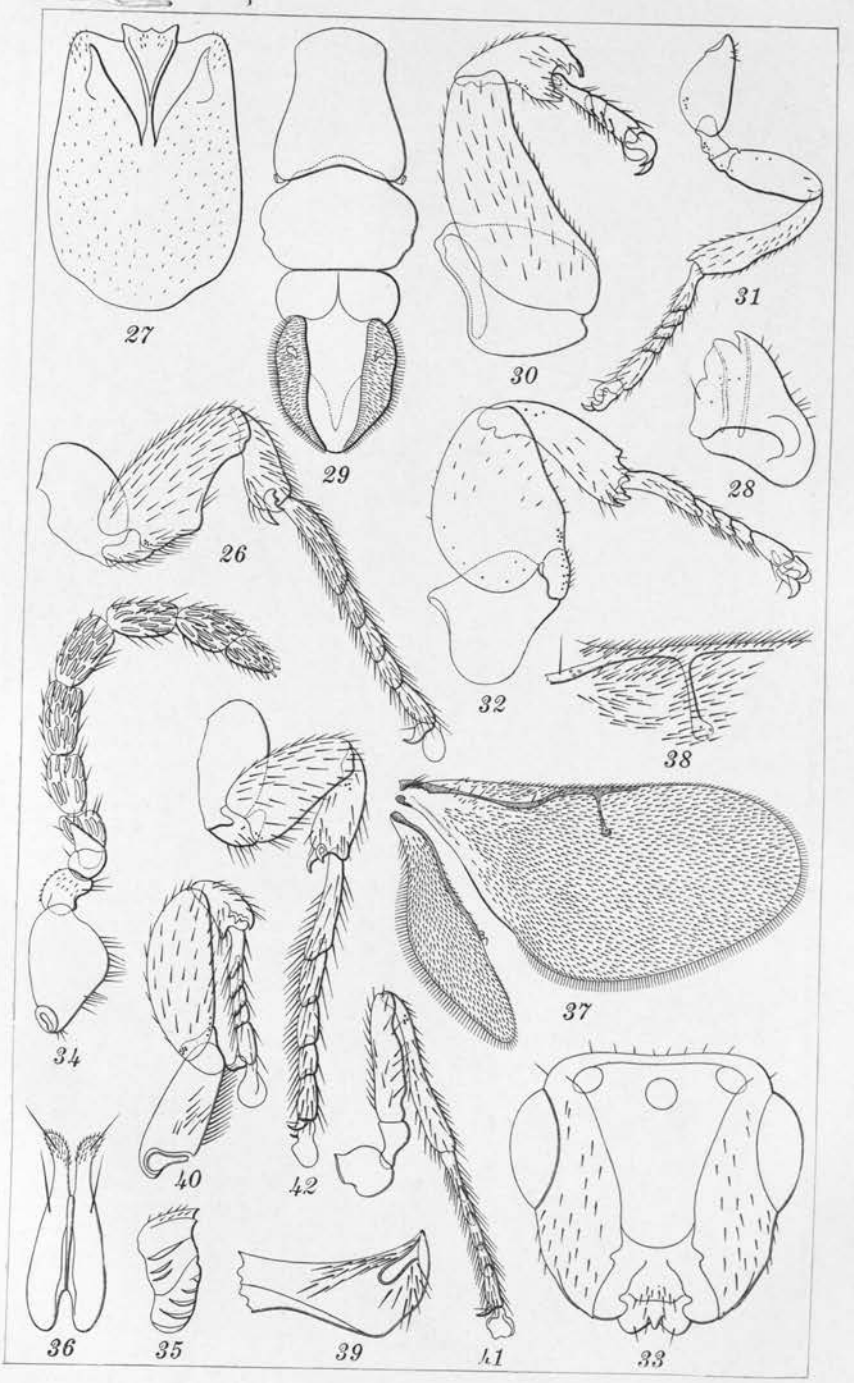

PLANCHE 3.

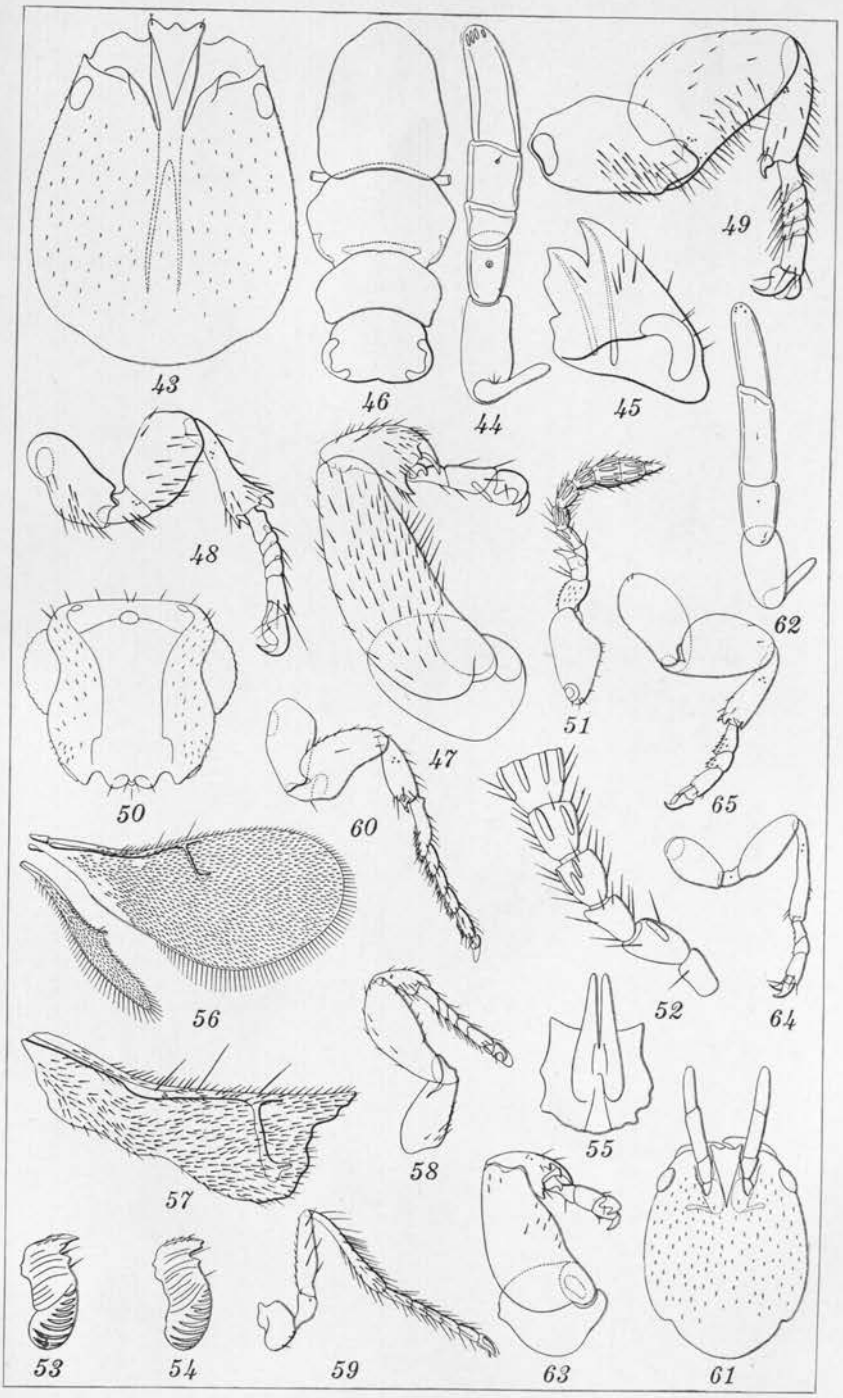

PLANCHE 4.

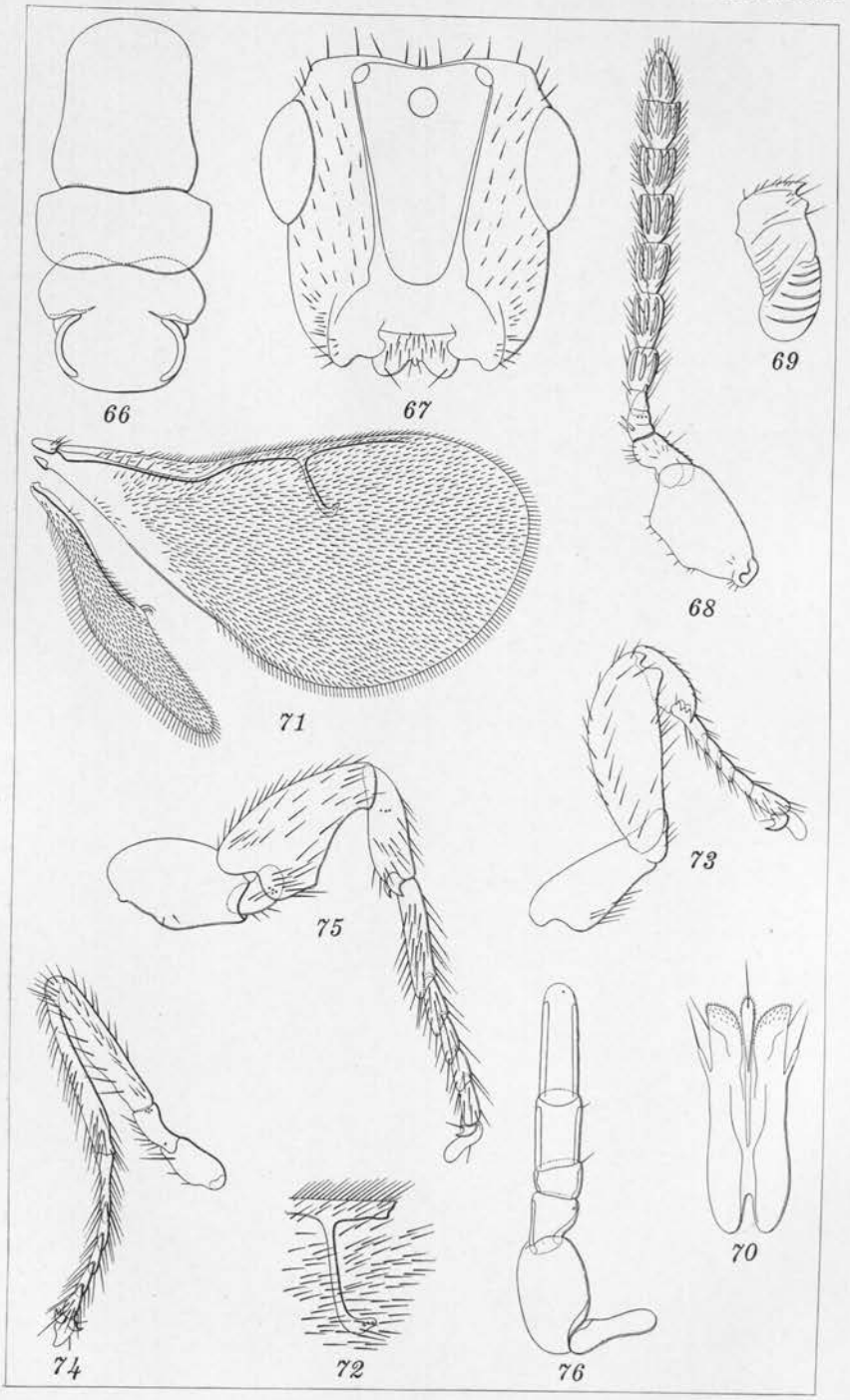

PLANCHE 5.

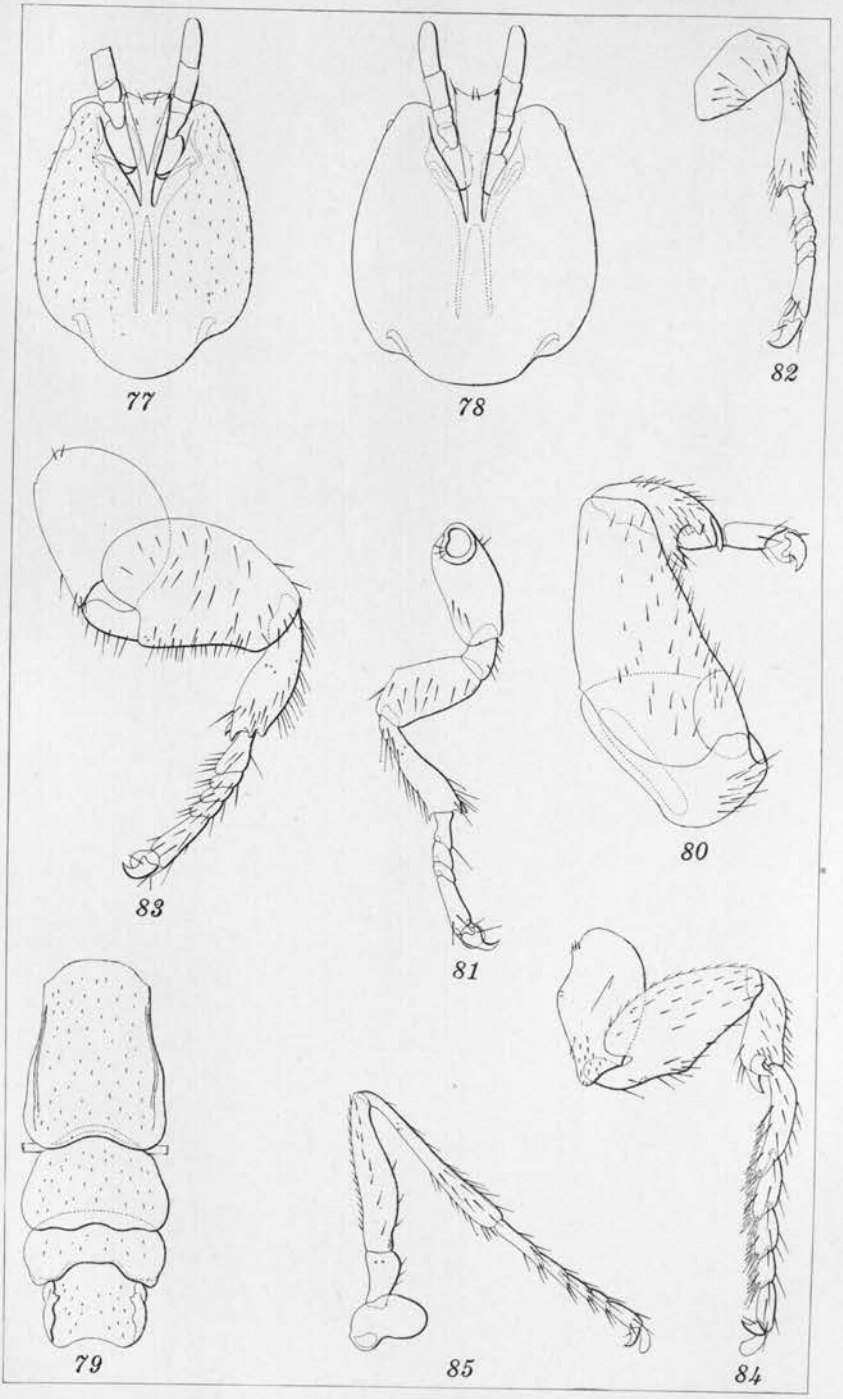

PLANCHE 6.

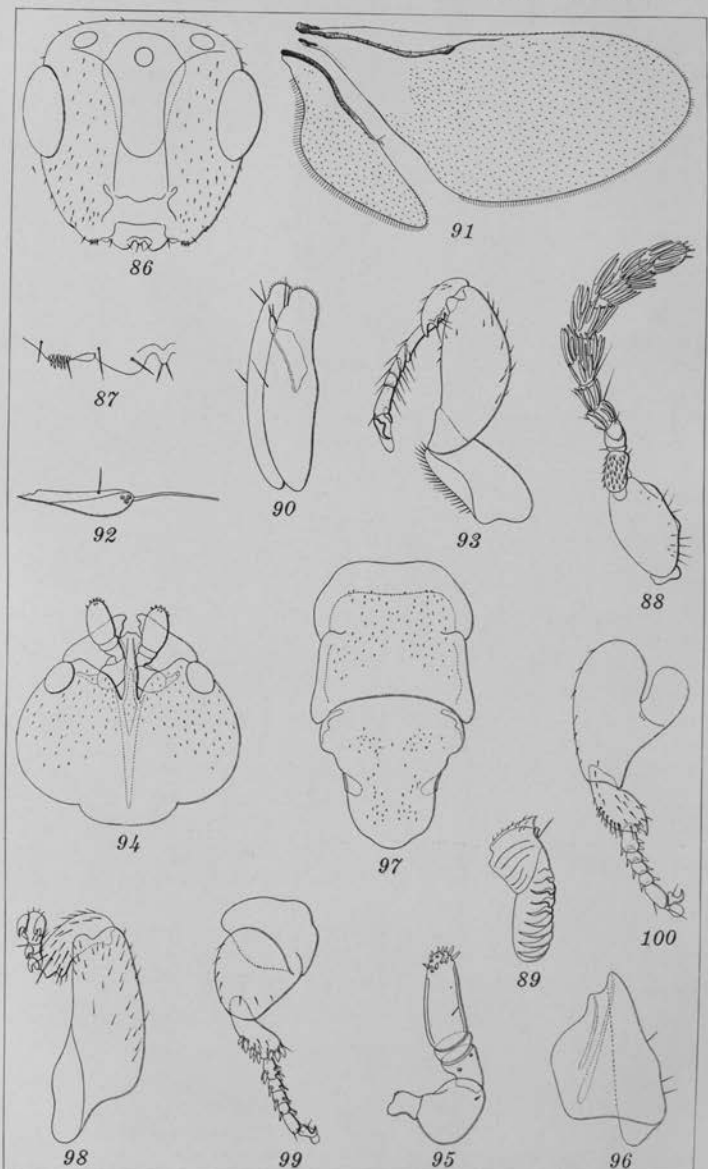

PLANCHE 7.